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Unfinished Business in New England
A Comparative Assessment of Environmental Problems. Risk Management Work Group Report

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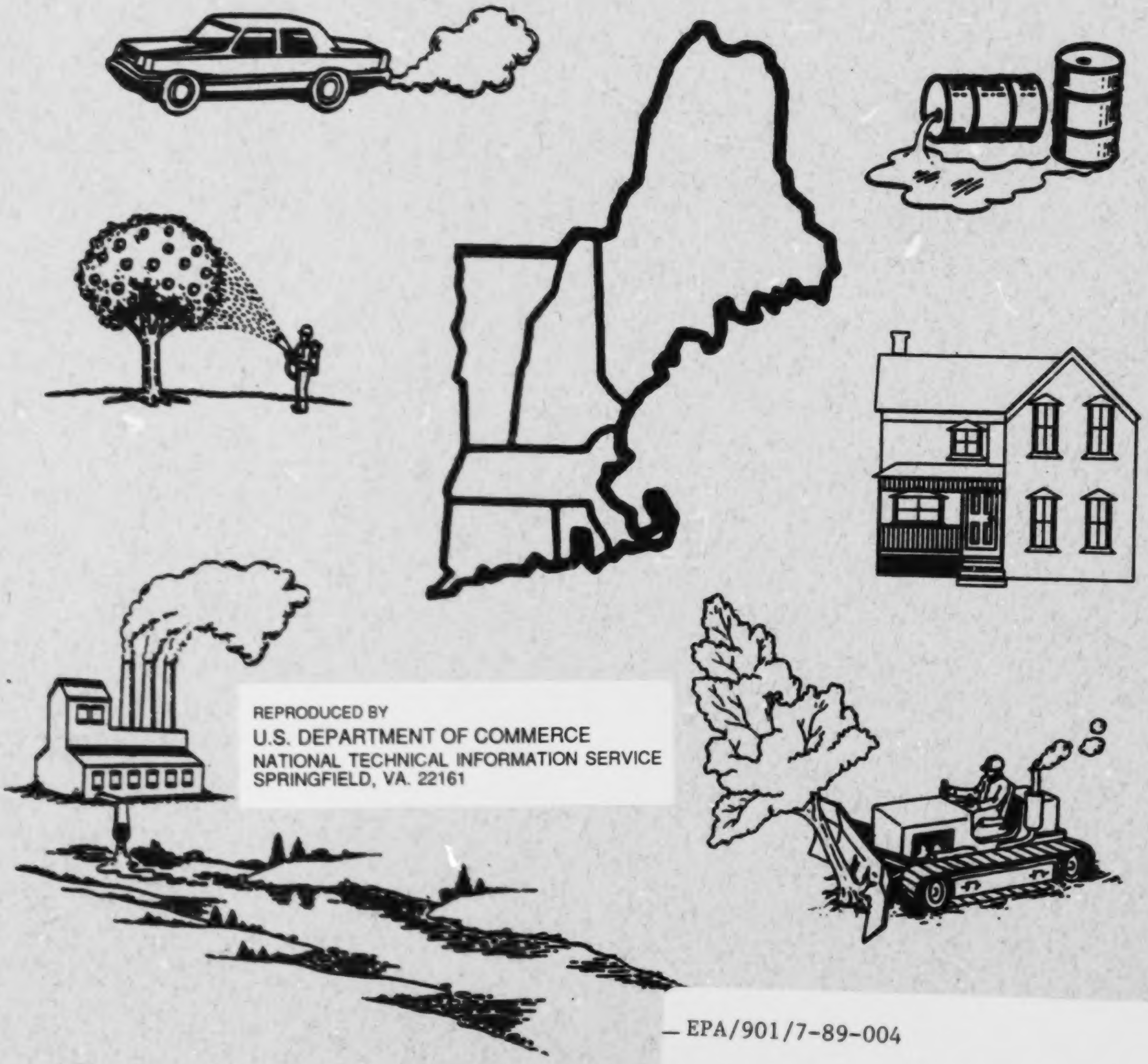
Risk Management Work Group Report



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This report presents the results of a study undertaken by EPA in New England that examined 24 environmental problems. The risk management work group identified and evaluated factors that should be considered by EPA management in developing and implementing strategies to reduce risks associated with these problem areas. The risk management factors that were evaluated were public perception, available resources, economic impact, legal authority, and effective technology. Each problem was ranked for each management factor based on the ease or difficulty in managing that specific problem. The Risk Management Work Group Report of Unfinished Business in New England: A Comparative Assessment of Environmental Problems did not to combine the different risk management factors into a single ranking.

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Unfinished Business in New England: A Comparative Assessment of Environmental Problems

Risk Management Work Group Report

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The following members of the Risk Management Work Group, representing various organizational components of the Region and Headquarters, were the principal contributors to the preparation of this report.

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I. Risk Management Evaluation Summary

The Risk Management Work Group identified and evaluated factors that should be considered by EPA management in developing and implementing strategies to reduce risks associated with 24 environmental problem areas. This effort was designed to supplement the risk evaluation conducted concurrently by the Public Health Risk and Ecological Risk Work Groups by assessing "real world" considerations and constraints in the decision-making process. The risk management factors evaluated were public perception, available resources, economic impact, legal authority, and effective technology. Each problem area was ranked on a scale of 1 to 5 for each management factor, with 1 indicating that the problem was "difficult" to manage and 5 indicating that the problem was "easy" to manage. Summary rankings for each factor are presented in Table I-1.

Methodology

Because the National Comparative Risk Project did not evaluate management factors, the Risk Management Work Group's initial task was to develop a methodology. First, we developed a candidate list of management-related factors. By a process of elimination and combination, the work group narrowed the number of factors to be evaluated from an initial list of 12 to a final list of five. A two-person team was then assigned to each management factor to develop a method for analysis and ranking. Each Factor Team presented its ranking system to the work group for discussion and critique, then drafted a Factor Paper. The Factor Papers were organized as follows: definition of the factor; ranking criteria and adjustment factors; sources of information and methodology; conclusions and recommendations; and problem area assessment and ranking.

For some management factors, existing information was limited, and the data that were available had a great potential for subjective interpretation. Various techniques were used to gather and evaluate data, including personal interviews with key program managers, completion of surveys and questionnaires by regional staff and private citizens groups, as well as research by work group members and contractors. Despite these efforts, evaluation of some management areas was made with limited information.

After all the information concerning each management factor had been gathered and presented, an initial ranking was made by the Factor Team. This ranking was then discussed and reviewed by the entire Risk Management Work Group, and a consensus ranking was assigned based on the overall knowledge and understanding of the group.

The work group decided not to combine the rankings for each of the management factors into a single overall ranking. Some questioned the need for such ranking. Additionally, work group members did not agree upon a simple, straightforward method to combine the rankings to properly reflect their relative weight and/or significance in the decision-making process.

Results

The management factors evaluated by Region I are consistent with those identified by Regions III and X and the State of Pennsylvania as part of their comparative risk projects. Every effort was made during the ranking process to eliminate subjective individual or programmatic biases and present a consensus ranking. The rationale for each factor ranking is discussed in the Factor Papers (Chapters II-VI). Below is a brief summary of the results for each management factor.

Public Perception

How the public perceives an environmental problem was viewed by the work group as a major factor in influencing EPA's response to that problem. Drinking Water and Superfund Waste Sites, two high priority regional problem areas, received the highest scores in public perception. Hazardous/Toxic Air Pollutants, Industrial Point Source Discharges to Surface Waters, RCRA Waste Sites, and Accidental Releases scored next highest. Radiation from Sources Other than Radon scored lowest.

The work group presumed that the higher the public perceived the risk to be, the more likely it would support efforts to reduce that risk, although we agreed that high public involvement may in some cases make the problem more difficult to control. The work group made no attempt to determine whether the public's perception of risk was accurate. Some of the other factors considered, such as effective technology and economic impact, also might influence public support.

Available Resources

The amount of personnel resources Region I has available to reduce risk in each of the 24 problem areas is limited. The work group evaluated current allocation of the Region I resources and compared that with the resources needed, based on workload model projections. No contract dollars were included in the assessment nor were resources associated with legal or administrative support services.

The work group found that almost all programs are underfunded, at an average of about 50 percent of the total needed resources. Seven problem areas were found to be funded at less than 25 percent of the needed resources. Two of the seven, Industrial Waste Sites and Municipal Waste Sites, are funded at less than 5 percent of needed resources. One area, Radiation from Sources Other than Radon, was found to be adequately funded. Some areas, such as Lead, are funded solely through reprogramming.

The Risk Management Work Group found it difficult in many cases to divide resources into the problem areas since they did not fit neatly into program workload models. Also, some programs do not have workload models, and the group had to rely on program managers to develop estimates and allocations. More effort is needed to accurately determine how much of our personnel resource addresses each problem area. Such a determination should also include an analysis of regional contract funds as well as state resources and grant funds if it is to truly reflect all resources being utilized for each problem area.

Economic Impact

The cost of control and the bearer of the cost must be considered in developing and implementing risk reduction strategies. To address this factor, the Risk Management Work Group attempted to utilize cost data being developed for EPA Headquarters by Temple, Barker & Sloane, Inc. (TBS) for another purpose.

Although some interesting and useful information was gathered, its value in management decision making is questionable. Major data gaps exist for this factor. The limited cost data available were national in scope and thus needed to be prorated to reflect Region I. The cost data in many cases did not represent the total cleanup costs, only partial remedies. Finally, costs were not presented on a consistent basis to allow comparison and ranking. Although one might have expected to readily locate cost data on EPA's environmental programs, it appears that a major data gathering effort would be required to develop complete, consistent information.

With the limited information available, the work group estimated that the four problem areas with the potentially highest cost impact for remediation are Criteria Air Pollutants, Hazardous/Toxic Air Pollutants, Superfund Waste Sites, and Lead. Six areas could not be ranked because no data were available.

Legal Authority

The work group team attempted to determine what state and federal authorities exist to reduce risk for the 24 problem areas. The effectiveness of the legal authorities was also considered. (Evaluation of local laws was not included in this analysis.) Requests to each state's Attorney General for information on state laws were not answered because their offices were unable to respond in time to be included in this analysis. The work group team thus had to use their personal knowledge of state laws and regulations. Further evaluation of the existence and effectiveness of state and local laws is desirable to strengthen this factor.

As expected, for the older established air and water programs such as Criteria Air Pollutants, Industrial Point Source Discharges to Surface Waters, and POTW Discharges to Surface Waters, the work group found that applicable and adequate legal authority, which has been successfully tested in the courts, exists. Applicable, adequate, and case-law-supported authority also exists for Accidental Releases and for Asbestos. The work group determined that four other areas have applicable, adequate, and implemented authorities, while for some areas, such as Superfund Waste Sites, adequate authority exists but the effectiveness of the authority is still not fully known. Four areas--Acid Deposition and Visibility, Radon, Indoor Air Pollutants Other than Radon, and Radiation from Sources Other than Radon--were determined to have little or no legal authority.

Effective Technology

The work group evaluated the technology or management practices that exist to reduce risk, whether the methods are reliable and efficient, and the proportion of the problem area to which they are applicable. In general, the work group determined that effective and applicable technology exists for all but a few of the problem areas. Areas ranked low were Wetlands/Habitat Loss, Accidental Releases, and Other Ground-Water Contamination, where the effectiveness of management practices or institutional controls was uncertain.

Conclusion

The Risk Management Work Group believes that the information developed and presented in this report will assist decision makers as they set priorities for control of the various environmental problem areas. Further refinement for some factor areas such as resources and legal authority may provide better insight. Substantial additional work in the area of economic impact would be necessary to allow for a meaningful comparative ranking. The public perception evaluation would likely be improved by more widespread sampling. The effective technology analysis is considered adequate as developed and presented.

As previously stated, the work group decided not to combine the rankings for the five management factors into a single ranking. The development of an overall ranking may be appropriate to consider in Phase II of the Risk Reduction Project.

Table I-1

Risk Management Work Group
Summary Ranking

	Problem Area	Public Perception	Available Resources	Economic Impact	Legal Authority	Effective Technology
1.	Criteria Air Pollutants	3	4	1	5	4
2.	Acid Deposition and Visibility	3	2	3	1	5
3.	Hazardous/Toxic Air Pollutants	4	3	1	3	5
4.	Radon	3	3	3	1	4
5.	Indoor Air Pollutants Other than Radon	3	3	--	1	4
6.	Radiation from Sources Other than Radon	1	5	5	1	4
7.	Industrial Point Source Discharges	4	3	3	5	5
8.	POTW Discharges	3	4	2	5	5
9.	Nonpoint Source Discharges	2	3	2	3	4
10.	Discharges to Estuaries/Oceans	3	4	2	4	5
11.	Wetlands/Habitat Loss	2	2	--	2	3
12.	Drinking Water	5	2	3	3	4
13.	RCRA Waste Sites	4	2	3	4	4
14.	Superfund Waste Sites	5	4	2	3	3
15.	Municipal Waste Sites	3	1	2	2	4
16.	Industrial Waste Sites	3	1	3	2	4
17.	Accidental Releases	4	3	4	5	3
18.	Releases from Storage Tanks	3	4	2	3	4
19.	Other Ground-Water Contamination	3	2	--	3	3
20.	Pesticide Residues on Food	2	3	4	4	4
21.	Pesticide Application	2	3	4	4	4
22.	Lead	3	3	1	3	4
23.	Asbestos	4	3	2	5	5
24.	Lakes, Ponds, and Impoundments	2	3	--	3	5

-- = No cost data available.

Note: 1 = Most difficult to control; 5 = easiest to control.

II. Public Perception Factor

Definition of Factor/Background

Public perception of risk involves various aspects of the knowledge, awareness, and understanding of each segment of the public about a situation's impact on the environment and/or on human health. This knowledge, awareness, and understanding may or may not be an accurate reflection of the situation's actual risk. Perceptual inaccuracies are often seen as the public distorting the actual risk, but these inaccuracies could also be the result of experts and policymakers oversimplifying the situation. The level of credibility that these experts and policymakers have affects how the public will perceive the risk of a given situation. Policymakers and other government officials are sometimes viewed as having motives other than public health guiding their decision making.

Risk management is a complex and sensitive undertaking for policymakers. People have a natural tendency to simplify issues, as substantive issues require them to consider more nuances and details than they may have the time or capacity to handle. We also tend to maintain our current beliefs unless presented with overwhelming evidence to the contrary. Finally, since a single person cannot be expert in all subjects, we find it difficult to detect omissions or inaccuracies in the evidence we are given. We have difficulty detecting discrepancies in information given by experts and even in evaluating true expertise. For these reasons, public perception of risk is highly subjective and involves beliefs based on a combination of experiences, knowledge, insight, skills, and information.

Public perception of a risk is also affected by the level of attention given to a situation by the media. Whether a fear is well-founded or exaggerated, it is often elevated to a high risk in the public perception through media attention. If, for example, the media provides extensive news coverage of a hazardous waste site that is believed by the scientific community and government experts to pose minimal to no risk, the media focus may heighten the public's perception of the risk. The roles of elected officials, who may serve as sources of information about a situation within their jurisdiction, also must be considered. Their public concern about a situation, combined with the respect for or popular interest in the elected official's position, may serve to increase media coverage, heightening the public's perception of the risk. Most fears, once cultivated, are very difficult to alleviate.

Risk perception experts have concluded that there are many characteristics other than mortality statistics that are factored into public perceptions of risk. Generally, people regard things that are familiar and voluntary as having little risk. A household product that has been used for a long time, no matter how carcinogenic, seems much less risky to public health and welfare than a nuclear power plant or a toxic waste site next door. Similarly, many people who smoke regard this activity as a more acceptable risk than something that they did not choose.

Situations over which a person has some control or the ability to mitigate are perceived as having low risk. Natural risks, such as radon in homes, may be perceived as low health threats. Because they are natural risks, they are viewed as familiar and capable of being mitigated, if not by the individual, then by a trusted "expert." Radon is a naturally occurring, colorless, odorless gas derived from the breakdown of uranium in rocks. For many people, the knowledge that they may have been living with radon in their homes and have not been adversely affected, thus far, is reason to believe the risk is low.

Conversely, situations that are involuntary are perceived as having high risks to public health. Accidental releases of pollutants into the air or water are feared as posing high risks to public health because they are uncontrollable, focused in time and space, and possibly undetectable. Such situations are often dread and consequently receive extensive media coverage. This causes the situation to be etched in people's memories and perpetuates a fear of such events in the future. The siting of a wastewater treatment plant or a municipal waste incinerator near residences also has a perceived high risk and may seem unfair because it is involuntary and controlled by others.

Sources of Information

There are many sources of information about public perceptions of risk. Information on the 24 problem areas covered in this paper comes from the news media; trade journals and magazines; federal, state, and local government agencies; advocacy groups; businesses; citizens living in the proximity of a problem area; the U.S. Geological Survey; public opinion polls (Harris, Roper, Gallup, Knight-Ridder, EPA, etc.) and, in certain cases, the Coast Guard, fire departments, police departments, and other emergency response organizations.

Ranking Criteria and Adjustment Factors

The initial rankings of the problem areas in this paper were determined by the authors according to certain qualitative criteria by which people categorize risks. While experts define risks as a function of the intrinsic hazard and the potential for exposure, the public considers many other, often nontechnical, aspects of risk. Environmental risk communication experts[1] describe the following 12 basic components of these nontechnical considerations of risk perception:

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[1] "Components of Community Outrage: The Missing Factor in Risk Analysis," Environmental Communication Research Program, State University of New Jersey at Rutgers.

a. Involuntary versus voluntary -- Coerced risks are much more outrageous and are therefore seen as much more risky.

b. Artificial versus natural -- Natural risks provide no enemy, no focus for anger.

c. Exotic versus familiar -- A household cleanser, for instance, seems less risky than a high-tech chemical facility that makes the cleanser.

d. Memorable versus not memorable -- Media coverage elevates risk perception; consider what Love Canal did to outrage over hazardous waste.

e. Dread versus not dread -- Cancer provokes more concern than, for example, emphysema.

f. Concentrated in space and time versus diffuse in space and time -- If smokers all died on November 13, we would outlaw smoking on November 14.

g. Controlled by others versus controlled by the individual -- Almost everyone feels safer driving than riding shotgun.

h. Unfair versus fair -- Poorer communities often feel that they are chosen for landfill sites simply because they lack the political clout to fight them.

i. Morally relevant versus morally neutral -- If pollution is merely harmful, then regulation should be cost-effective; but if pollution is also "evil," no compromise is acceptable.

j. Undetectable versus detectable -- As an experienced war correspondent said at Three Mile Island, "At least in a war you know you haven't been hit yet."

k. No visible benefits versus clear visible benefits -- Risks with a payoff are not only more acceptable, they actually feel less risky.

l. Untrustworthy sources versus trustworthy sources -- Risk information feels less risky from a much-loved family doctor than from a faceless or uncaring "bureaucrat."

Initial Rankings

This paper uses a ranking system of 1 through 5, with 1 representing a perception of low risk and 5 representing the highest level of risk. The rankings can be described as follows:

1. Little or no public interest or awareness exists about a situation that poses a risk to human health or the environment (e.g., zero to few calls to EPA from the public; zero to little media coverage).

2. Environmental groups (established organizations as opposed to ad hoc committees or citizen groups) have made telephone inquiries about the problem, or have requested a meeting(s) with EPA, or have asked to receive all public information/correspondence related to a situation because of the perceived risk it may pose to human health or the environment.

3. Environmental groups/citizens have indicated opposition to a project/situation in formal written comments or in testimony at a public hearing. Comments and testimony require formal response by EPA.

4. In addition to the criteria described in ranking 3, Congressional inquiries have been received and/or the situation has been the subject of media coverage.

5. In addition to the criteria for rankings 3 and 4, legal action has been filed against EPA for failure to address/resolve the general public's or public interest group's concerns to its/their satisfaction.

Adjustment Factors

To reach a consensus on the public's perceptions of the risks of the following 24 problem areas, a survey was developed for distribution to leaders of New England's established environmental groups. Respondents were asked to read the descriptions of each of the 24 problem areas and to rank them from 1 through 5 according to the risk they pose to public health and the environment. They were asked to distribute the rankings evenly among the problem areas (i.e., four or five of each score) and were reminded that their rankings should reflect the perceptions of the group that they represent. A draft of this paper also was distributed to senior staff members in Region I for their concurrence and comment.

Based on survey results and additional comments, the rankings of the problem areas (originally determined on the basis of the criteria ascribed to each of the aforementioned numerical rankings) were adjusted to either a higher or lower ranking, as follows:

- If the majority of the senior staff ranked the problem area higher than its original score, ranking was increased by one.
- If the majority of the senior staff ranked the problem area lower than its original score, ranking was decreased by one.
- If average ranking of a problem area's risk by environmental groups was one ranking higher than the original score, the overall ranking was increased by one.
- If the environmental groups' average ranking of a problem area's risk was two or more rankings higher than the original score, the final ranking increased by two.
- If the environmental groups' average ranking was one ranking lower than the original score, then the ranking was decreased by one.
- If the environmental groups' average ranking was two or more rankings lower than the original score, the ranking was decreased by two.

An example of this method follows:

Problem area A -- original ranking = 3
entire senior staff concurred = no change
average environmental group ranking = 4
new ranking = 4

As a result of this methodology, the final rankings reflect both the initial ranking criteria and the adjusted criteria.

In addition to the ranking of each problem area, there is a brief discussion of the types of risk perception factors that may influence the public's perception of the problem.

Problem Area Assessments and Rankings

1. Criteria Air Pollutants: ranking = 3 (initial ranking = 2)

The criteria air pollutants include particulate matter with a diameter of 10 microns or less (PM_{10}), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), lead (Pb), carbon monoxide (CO), and ground-level ozone or smog (O_3). National Ambient Air Quality Standards (NAAQS) have been set for these pollutants to protect human health. Public perception of the risk associated with exposure to ambient air quality that exceeds the NAAQS has been on the low side, historically. Evidence of the public's perception of low risk includes the need for a mandatory lead-in-fuel reduction strategy and a general reluctance to reduce automobile use voluntarily (through carpools, which people seem to do for other reasons, such as gas shortages and parking freezes).

2. Acid Deposition and Visibility: ranking = 3 (initial ranking = 2)

People are usually more concerned with risks to public health than risks to the environment or ecosystems. For the segment of the population that views acid deposition as having adverse impacts on forests, statues, and buildings, acid deposition ranks higher on the perceived risk scale than for the segment of the population that is not concerned with ecological effects. Again, the economics and conveniences offered by current manufacturing processes (particularly in the automotive industry and for companies using smokestacks) are perceived as "worth the risk." The problem is chronic; thus, any possible future adverse effects may seem distant in time and may lower the risk perception by some of the public. The perceived risk could be heightened by the fact that the problem area is controlled by industries, which are not always trusted, rather than by the individual.

3. Hazardous/Toxic Air Pollutants: ranking = 4 (initial ranking = 4)

This risk is perceived as high since it is involuntary, unfamiliar, artificial, and unfair. If a company in a community emits toxins into the air, the community generally feels anger. They perceive such air as acutely dangerous to breathe and the company as responsible for the uneasiness they feel and the threat to their health. This threat is perceived as controllable by the company, not by the individual.

4. Radon: ranking = 3
(initial ranking = 3)

Surprisingly, radon has not been perceived as the dread pollutant that EPA anticipated it might be. Although EPA offices are deluged with telephone calls from new and potential homeowners requesting information about detecting and mitigating high radon levels, other segments of the public, such as people who have been living in one home for a long period of time, are not concerned with radon. This is often true even in communities where high levels have been detected, when the levels occur naturally in the homes. Contrast this with the case of three New Jersey communities that were located near a landfill that contained radioactive industrial wastes. The radioactivity was at levels no higher than in homes with naturally occurring radon. Yet, the New Jersey communities succeeded in demanding hundreds of thousands of government dollars per home for cleanup of the landfill. The difference here was that the problem was caused by and controllable by someone besides the individual.

Acceptance of radon is likely due to its status as a naturally occurring element and the fact that it has been around for a long time. The threat is chronic rather than acute. Older people, especially, hold the opinion that if they have lived this long with radon around, there is little need to suddenly be concerned about installing mitigative devices or paying for any alterations to their homes.

5. Indoor Air Pollutants Other than Radon: ranking = 3
(initial ranking = 3)

This category includes building materials (urea formaldehyde) and wood stoves that may emit pollutants but that are considered necessary and therefore may be viewed as almost "natural" in the way they are accepted. The category also includes tobacco smoke, which is an involuntary health risk for many people.

6. Radiation from Sources Other than Radon: ranking = 1
(initial ranking = 1)

This problem area does not include accidental releases of radiation (e.g., from a nuclear power plant) but does include non-ionizing sources of radiation (e.g., extremely low frequency radio stations) and medical or dental x-rays. This exposure is perceived as a low risk because precautions are taken to control the risk (e.g., lead vest). Doctors are generally trusted in matters regarding public health. Also, radiation has been used "safely" in this form for many years, so it is familiar and, to some extent, voluntary (people can decide against having x-rays).

7. Industrial Point Source Discharges to Surface Waters: ranking = 4 (initial ranking = 3)

This problem area is perceived as a high risk if it involves a release to a body of water used for drinking, fishing, or swimming. People feel particularly threatened by discharges from industries, especially if the discharge is directly into a body of water that is used as a drinking-water supply. The pollution is unfamiliar, uncontrollable by the individual, and perceived as unfair.

8. POTW Discharges to Surface Waters: ranking = 3 (initial ranking = 3)

Perceived risk is medium to high unless there is a direct threat to drinking water, in which case the perceived risk is quite high. Swimming and fishing in polluted waters may be perceived as risky, but are usually seen as lower risks than drinking the water. As demonstrated by the public's continued mistreatment of Boston Harbor, the nation's most polluted harbor, the public does not perceive all polluted waters as high risks. While people are beginning to be concerned, there is still a reluctance to pay increased water usage rates to clean up the pollution. This indicates that many people do not feel personally responsible or personally threatened by the pollution, even if they miss certain harbor recreational activities. If a drinking water source is discolored or odoriferous, and if it is going to be used by a majority of the public, the perceived risk will be greatly elevated.

9. Nonpoint Source Discharges to Surface Waters: ranking = 2 (initial ranking = 2)

Regardless of the source of the pollutants, the perceived risk is higher in cases where the water is used for drinking and, to a slightly lesser extent, for swimming and fishing. While people will feel that direct contamination of the water by a company is involuntary and unfair, especially if the public is not contributing to the polluting in any way, their concern will be greatest where they perceive the most direct threat to their health. Recreation, esthetics, and real estate are not given the same consideration, in most cases, as health. There are cases, however, in which economics does play an important role in the public's definition of risk. (See the New Bedford Harbor Superfund site cleanup example in problem area #14 and the wetlands examples in problem area #11.)

10. Discharges to Estuaries, Coastal Waters, and Oceans from All Sources: ranking = 3
(initial ranking = 3)

Inlets that may be used for swimming and non-commercial fishing pose a risk to the public when polluted. The perceived risk is lower where there is less contact with people. Some large estuaries, such as Long Island Sound and Buzzards Bay, generate great concern when there is a real or perceived threat to their fish population. The perceived risk is high when shellfish beds become closed due to contamination. The perceived risk is highest in areas where the population is in close proximity to the polluted water: Since 85 percent of the New England population lives within 20 miles of the coastline, the perceived risk related to this problem area will most often be high.

11. Wetlands/Habitat Loss: ranking = 2
(initial ranking = 1)

This problem area has a very low perceived risk by most segments of the public who are not concerned with ecological welfare. Citizens, business groups, and politicians are often not as concerned with protecting wildlife and their habitats as are "true environmentalists" (including naturalists and members of grass-roots organizations and national groups such as the Sierra Club and the Audubon Society). This is evidenced by the public willingness to fill wetlands for construction of shopping malls, homes, and a multitude of other uses. The attitude may be due to ignorance about the values of wetlands for flora, fauna, and the prevention of floods, or it may simply be due to the public placing economic benefits higher than environmental benefits.

12. Drinking Water: ranking = 5
(initial ranking = 5; average environmental group ranking = 4/5)

As stated above several times, this problem area is rated as a very high risk because contaminated drinking water poses a very direct and personal threat to public health. It does not matter what the contaminant is. Emotions run high when drinking-water supplies are threatened, particularly by accidental releases due to their suddenness, involuntariness, and the lack of control the public feels when presented with this problem.

13. RCRA Waste Sites: ranking = 4
(initial ranking = 5)

The "Not in My Backyard" (NIMBY) syndrome is prevalent to the degree that any siting or consideration for siting a sewage treatment plant, nuclear power plant, recycling facility, incinerator, solid waste landfill, etc., is greeted with intense opposition or antagonism. Ongoing facilities, as well as possible new RCRA sites, rank high in public perception of risk. People fear potential spills or accidental releases, even if it is highly unlikely that this could occur. The perceived risk is heightened because of the lack of individual control of this problem.

Depending on the type of facility or landfill to be sited, people may not have much trust in the builder, planner, or government officials who are involved. This sense of unfamiliarity and involuntary decision making causes additional feelings of mistrust, unfairness, and lack of control, all of which make the problem area seem that much more negative and risky. Given all of this, there is still apathy about this problem area in the segments of the public that are not immediately or personally threatened by a facility, hence the lower ranking by the environmental group survey respondents than by the authors.

14. Superfund Waste Sites: ranking = 5

Though the actual severity of risk at different sites varies greatly, people generally regard these unwanted, unfamiliar hazards as high risk. The fact that they are identified as "hazardous" on a federal list implies that great caution should be taken in dealing with them. People may not be aware of the reasons for ranking a site, the types of contaminants involved, and the exposure pathways. A site could be close to a schoolyard or other area that children frequent and would be considered highly dangerous. Another site of the same proportions and containing the same chemical contaminants may be in a very deserted area with no residences and few plants and animals and would be regarded as less risky.

Other factors come into play when a site may have adverse effects on tourism, fishing, swimming, or real estate in a community. The residents may believe that the site does not pose a significant threat to public health, but they will fight to have it cleaned up if it is going to negatively affect the economics of the area. Conversely, certain segments of the public (e.g., the business community, chamber of commerce, or the general populace in a town in which the alleged polluter is also the sole employer) may accept a certain amount of risk and ignore it or try to downplay it if addressing the risk may harm the economy.

If a hazardous waste site has been created by a business in the community, citizens may feel resentment. People want the company to take responsibility for correcting the problem. In a case where the majority of the townspeople are employed by the offending company, however, the public perception of the risk may be lower.

15. Municipal Waste Sites: ranking = 3
(initial ranking = 3)

Medium risk is perceived for this category unless toxic contaminants are believed to be at the site, in which case people fear accidental releases to ground water, etc. If people do not make a connection between the existence of chemicals and a threat to ground water--hence drinking water--the perceived risk will not be high.

16. Industrial Waste Sites: ranking = 3
(initial ranking = 3)

A medium to high risk is perceived, particularly where industries do not hold a favorable position in the community. The risk posed is seen as unfair, involuntary, uncontrollable, impossible to mitigate individually, unfamiliar, or "hidden".

17. Accidental Releases: ranking = 4 (initial ranking = 5)

The unfamiliarity and suddenness of accidental releases causes the public to rank the problem area as having a high risk. The perceived risk would be low only if the public believed in the unlikelihood of occurrence, the necessity of many of the manufacturing/other operations that might have such releases, and the possibility that only harmless chemicals or minute amounts may be released. Still, accidental releases are generally perceived as having a high risk because they are uncontrollable. The very term "accidental release" implies a sudden emergency and loss of control--not even the people in charge of the facility planned the occurrence or had the power to stop it. It is perceived as particularly risky if the release is into drinking water.

18. Releases from Storage Tanks: ranking = 3 (initial ranking = 3)

Only when the public becomes aware of such a release, or at least of the existence of an underground storage tank, is the risk perceived as high. If they are unaware, they do not fear it. If the media or other public entity announces that old tanks that could release contaminants exist, the perception of risk would be high. Generally, the public assumes that tanks holding gasoline are safe because they are familiar with the tanks. If an actual release does occur and people are aware of it, their sense of security would be challenged greatly and they might fear harm to their drinking water. They would insist on proper remediation of the problem but would not be likely to continue fearing all such tanks.

19. Other Ground-Water Contamination: ranking = 3 (initial ranking = 4)

Where any threat to drinking water comes from an unknown, unfamiliar contaminant, people will perceive the problem as a high risk; however, not all people recognize ground water as drinking water. Also, not everyone is aware of a connection between road salt and sodium-contaminated ground water. In these cases, the perceived risk will be low. In addition, if the public does not come into contact with the water in any way because of its distance from their homes, etc., they may perceive the risk as slightly lower. When it is ground water as opposed to an ocean that is polluted, most people would have some concern about the eventual threat to their drinking-water supply, if they are aware of the connection between ground water and drinking water. (The risk perception also depends on the extent and nature of the contamination.)

20. Pesticide Residues on Food: ranking = 2
(initial ranking = 2)

The perceived risk develops in relation to the level of media coverage of the problem area. Unless there is alarming evidence that human and animal health and welfare are endangered by the pesticide, people are not likely to change long-held beliefs or practices. If a pesticide is new to the market and reports of adverse effects on humans and animals appear immediately and often, or if there are new reports about the risks from an existing pesticide, people will be more concerned about eating the exposed food than when it is something that they have already been consuming for quite some time. Generally, people will trust the evidence of adverse health effects if it is scientific and conclusive, and they will be cautious about eating the pesticide-contaminated product.

21. Pesticide Application: ranking = 2
(initial ranking = 2)

The segment of the public that is most concerned about this problem is farm workers. Farmers may believe that the risk to themselves is minimal because they are skilled at applying pesticide. If controls are not available, these skilled workers may perceive the risk as higher. Unskilled workers are more likely to perceive the risk as low if they are ignorant of the dangers of these chemicals. If they are aware of the dangers, but are forced to do the work out of economic necessity, they may accept the risk while perceiving it as medium to high.

22. Lead: ranking = 3
(initial ranking = 2)

There is some public awareness of the problem of lead poisoning from drinking water when homes contain lead pipes or pipes with lead soldering. In general, it is considered a familiar risk; therefore, the risk is perceived as low. There is not much awareness of the problem of lead in soils from houses painted prior to 1950. In primarily urban areas where homes are close together, the paint chips or dust from homes once coated with lead-based paint gets into the soil and is easily ingested by children playing in or simply breathing the lead dust. Children younger than six years are especially vulnerable to nervous system disorders, behavioral and learning problems, or even death. In urban areas where the problem is most common, there is a higher awareness of the problem, but still not significant concern. This may be due to lack of public education about the problem.

23. Asbestos: ranking = 4
(initial ranking = 3)

This problem area was once accepted as familiar and reasonably safe. More recently, people are succumbing to the adverse health effects of direct contact with the substance in earlier years. As the diseases asbestosis and cancer become more prevalent as a result of contact with asbestos, lawsuits have arisen, and the general public has become more aware of the problem. Asbestos is no longer the necessary, cost-effective, and marketable product that it once was, as more substitutes become available.

24. Lakes, Ponds, and Impoundments: ranking = 2
(initial ranking = 4)

These water bodies are closely related to drinking-water sources and are used for swimming and fishing. Therefore, perceived risk of a threat to them would be medium to high where people make this connection. People fear that the pollution would reach them directly through any of these recreational activities or through drinking water; where the water bodies are not used for recreation, the perceived risk will be lower. If the water is not used for drinking, the perceived risk will be still lower. Perception of risk related to drinking water depends upon how people get their water (private wells or public supply), if there is or is perceived to be a direct connection between the contaminated body of water and drinking water, and if the community relies heavily on the industry(ies) that are responsible for the contamination. In New England, lakes and ponds are generally not used for drinking water, but mostly for recreational purposes. In this case, the perceived risk to public health and welfare is low to medium.

Attachment II-A

Summary of Public Perception Rankings

		Ranking
1.	Criteria Air Pollutants	3
2.	Acid Deposition and Visibility	3
3.	Hazardous/Toxic Air Pollutants	4
4.	Radon	3
5.	Indoor Air Pollutants Other than Radon	3
6.	Radiation from Sources Other than Radon (non-ionizing)	1
7.	Industrial Point Source Discharges to Surface Waters	4
8.	POTW Discharges to Surface Waters	3
9.	Nonpoint Source Discharges to Surface Waters	2
10.	Discharges to Estuaries, Coastal Waters, and Oceans from All Sources	3
11.	Wetlands/Habitat Loss	2
12.	Drinking Water	5
13.	RCRA Waste Sites	4
14.	Superfund Waste Sites	5
15.	Municipal Waste Sites	3
16.	Industrial Waste Sites	3
17.	Accidental Releases	4
18.	Releases from Storage Tanks	3
19.	Other Ground-Water Contamination	3
20.	Pesticide Residues on Foods	2
21.	Pesticide Application	2
22.	Lead	3
23.	Asbestos	4
24.	Lakes, Ponds, and Inpoundments	2

III. Available Resources Factor

Definition of Factor/Background

The resource factor assesses the amount of resources available to Region I to address each of the 24 problem areas relative to the resources needed to address the problem area. The focus of the analysis was on work-years needed to carry out EPA programs and/or functions. Contract dollars were not included in the analysis unless they were used to supplement staff or where they were the controlling factor in addressing the problem. The ranking was also limited to program staff resources and did not take into account administrative support resources (e.g., regional management, personnel, support services, which would be categorized as overhead and apportioned to all program resources) or legal resources, which are funded separately.

Sources of Information

- EPA's FY88 Operating Plan provided data on national allocations and regional distributions of resources for the program elements.
- Workload models for each program element, including pricing factors and priority activities when available, provided information on total need for each element.
- Interviews with each program element coordinator or Branch Chief helped determine the source levels assigned to each problem area and an estimate of total resource needs where no information was included in workload models.

Ranking Criteria and Adjustment Factors

The ranking process consisted of an initial ranking based on the percentage of funding available to Region I compared with the total resources needed to address the problem area. The rankings and their criteria are as follows:

1. Zero or very limited resources allocated; less than 5 percent of the needed resources
2. Minimal resources allocated; less than 25 percent but more than 5 percent of the needed resources
3. Underfunded; less than 50 percent but more than 25 percent of the needed resources allocated

4. More than 50 percent but less then full funding allocated

5. Adequate funding; at the workload model total pricing level or at a level Region I feels is adequate to address the problem area

This initial ranking was determined by utilizing the information in the workload models or through discussions with the Program Managers where information was inadequate or unavailable. The EPA distributes resources and develops workload models according to program elements. Since these program elements do not match exactly to the 24 problem areas defined for the risk evaluation project, a review of the FY88 workload models for each program element and discussions with the Program Manager formed the basis for the assignment of program elements or percentages of program elements to each program area.

The initial ranking was then adjusted up or down, based on interviews with Program Managers,[1] according to the following adjustment factors:

- Program Manager thinks the resources defined by the workload model are accurate and adequate to address the problem: no change to the initial ranking.

- Program Manager thinks the resources defined by the workload model are not adequate to address the problem: decrease the ranking by 1.

- Program Manager thinks the resources defined by the workload model are more than that needed to address the problem: increase the ranking by 1.

- If there are no documented data on total need, the interviews with the Program Managers were used to determine the initial and final ranking: no adjustments were made.

- If the Region has significantly supplemented the resources available to a program, decrease the ranking by 1.

Several assumptions were made in conducting this analysis:

1. That the information in the workload model was accurate and reflected the resources needed to address the problem area as defined. Where this was not the case and EPA does not currently have a program to address a particular problem or part of a problem, it was discussed in the report and the ranking adjusted accordingly.

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[1] In most cases, the Program Manager was the Branch Chief.

2. A significant portion of the ranking process depends on the Program Manager's honest assessment of a program's resource needs and the consistency of that assessment across New England. The only check on this information is review at the senior level and from the work group's collective review and ranking of the information. In several instances, the Program Managers were asked to rank one program relative to another program for a "reality check" on the final rankings.

Conclusions and Recommendations

- The level of sophistication among the workload models differs significantly, ranging from fully developed pricing factors and priority ratings for each activity to just a distribution among the regions based on historical information.
- Almost all programs are underfunded. The average funding is about 50 percent of the total needed resources.
- Programs with little or no regulatory authority have minimal resources.
- Several programs were not included in the ranking because they either did not fit into any one category or, if distributed among several programs, would have been too fragmented. Both of the following programs, for example, are underfunded:
  - APSL9G, Office of Pesticides and Toxic Substances (OPTS) - Title III, and APTL3G, OPTS-Enforcement Title III. These programs are multimedia and deal with developing inventories under Section 313 of SARA. (The Title III Section 313 Program, if ranked, would be a 2, based on the Program Manager's estimate.)
  - AFLL3A, Toxic Substances Enforcement. The Toxic Substances Control Act Program deals primarily with risks associated with direct contact with consumer products and only the waste disposal issue (primarily PCBs) and the asbestos-in-school program are covered by the problem definitions. (The Toxic Substance Enforcement Program would rank 3 based on the Program Manager's estimate.)

Problem Area Assessments and Rankings

The following descriptions contain EPA account codes that represent the only consistent method of identifying specific EPA program elements. The authors regret using such jargon (the codes) but there is no applicable substitute.

1. Criteria Air Pollutants: ranking=4
(initial ranking=4)

In general, Region I is funded at about 60 to 65 percent of the total needed to address the regulatory requirements for criteria air pollutants under the Clear Air Act. The criteria air pollution portion is 86 percent of the Air Quality Management Workload Model, about 73 percent of the Stationary Source Enforcement Workload Model, and about 88 percent of the Ambient Air Quality Workload Model. These models are funded at 62 percent, 57 percent, and 73 percent, respectively, of the total need identified in each model. Each of the Program Managers contacted felt that criteria air pollutants could be adequately addressed if funded at the total resource levels identified by the model. However, the funds are only 60 percent of the total need. In addition, Region I has shifted some resources slightly to address other air problems not adequately funded, e.g., toxics and indoor air.

2. Acid Deposition and Visibility: ranking=2
(initial ranking=4)

Region I currently operates a very limited program to deal with acid deposition and visibility. For acid deposition there is no regulatory program, only a public education outreach effort. Visibility problems are addressed through a limited regulatory program. Funding for both programs is only 3 percent of the Air Quality Management Implementation Program Workload Model. The Air Quality Management Workload Model is funded at 60 percent of the total need. The Program Manager believes that these resources, however, would not be sufficient to address the problem area if the EPA implemented a comprehensive program to address acid deposition and visibility, and that the total need would be considerably higher.

The work group felt that since this problem was only a small percentage of the Air Quality Management Implementation Workload Model and the current program is very limited, the overall ranking should be dropped to a 2.

3. Hazardous/Toxic Air Pollutants: ranking=3 (initial ranking=4)

The Air Toxic Program primarily provides technical assistance to develop technical capabilities and regulatory programs at the state level. Through the Air Quality Management Workload, this program is funded at 2.2 work-years (wy), about 60 percent of the 3.6 wy stated as the total need for this program. The Program Manager believes these are realistic figures for total need. The Air Quality Monitoring Workload Model provides 0.9 full-time equivalent (FTE) for air toxics monitoring support--about 70 percent of the total resource need in the model. The Program Manager, however, feels that the actual resource need is higher and that current funding is only 50 percent of the need.

The second area of resource need is air toxics support for the Superfund Program. This is presently funded at 0.8 wy under TPXY9F and at 0.2 wy of the Superfund program resources. The Program Manager believes that the total need is about 2.0 wy. In addition, the need for air monitoring support for this program is an additional 1.0 FTE. Therefore, this program is funded at about 33 percent of the total need, based on discussions with the Program Manager.

4. Radon: ranking=3 (initial ranking=3)

Region I is presently allocated 1.4 wy to address radon under ATKF2D, a technical assistance and informational awareness program. The Program Manager estimates that another 1.0 FTE would be needed to adequately carry out this non-regulatory program. The region also currently provides a small amount of additional resources to the program. Therefore, the program is currently funded at about 50 percent of the total need. However, if a regulatory program were to be implemented, this area would be severely underfunded. The Program Manager also believes, based on the risk related to this problem, that EPA should be expanding the current program.

5. Indoor Air Pollutants Other than Radon: ranking=3 (initial ranking=4)

The Air Quality Management Workload Model now provides 0.5 wy to address indoor air pollution other than radon. Like the radon program, this effort is for a non-regulatory, technical assistance program only. The workload model estimates support to be at 60 percent of the total resources needed. The Program Manager, however, estimates the total need to be 2.0 to 3.0 FTE, and the program therefore only is funded at the 20 percent level. The Program Manager also feels strongly that this is probably one of the most severely underfunded programs in Region I, based on the risks associated with this problem area.

6. Radiation from Sources Other than Radon: ranking=5 (initial ranking=5)

This problem area covers non-ionizing radiation only. Region I receives 0.6 wy under the ASYF2D Radiation Program Implementation. Of the 0.6 wy, about 0.2 to 0.3 wy is spent on non-ionizing radiation, primarily to answer public inquiries or to support a state on a specific case or incident. The Program Manager feels that, given the risk associated with this problem, the work-years are adequate. The remaining work-years funded by ASYF2D deal with radiation from nuclear sources and are not included in any problem area definition.

7. Industrial Point Source Discharges to Surface Waters: ranking=3 (initial ranking=4)

Region I is funded at about 75 percent of the total need if we include the minor permit shortfall for permit issuance. The Water Quality Enforcement Program for the permit program, however, is funded at 50 percent of the total need. Funding for programs to establish standards and regulations as well as to manage water quality is approximately 75 percent of the need, and the program for ambient water quality monitoring is funded at 50 percent of need, according to the model. Because of the funding shortfall, first priority is given to the major permit work, resulting in a minor permit backlog. While the various program elements are ranked as 3 or 4, the Program Manager feels the adjusted rank should be a 3. This ranking reflects the toxics work and other complexities involved in the new permits.

8. POTW Discharges to Surface Waters: ranking=4 (initial ranking=4)

The comments for problem area #7, Industrial Point Source Discharges to Surface Waters, apply here. In addition, the resources for the Wastewater Treatment Facility Construction Program and Operation and Maintenance Program are funded at about 65 percent, according to the national model. The Program Manager feels that these resource estimates are accurate.

9. Nonpoint Source Discharges to Surface Waters: ranking=3 (initial ranking=4)

The Nonpoint Source Program is part of the Water Quality Management Program element. The resources to carry out the program are insufficient. While the overall model is ranked at a 4, the Program Manager feels that additional resources would be needed for the nonpoint portion of the work.

10. Discharges to Estuaries, Coastal Waters, and Oceans from All Sources: ranking=4 (initial ranking=4)

The Coastal Environmental Management Program includes the marine discharge waiver (301h) and comprehensive estuarine management functions. This program is about 80 percent funded under present conditions. If additional "bays" in New England are designated for study, additional funding will be necessary. The Ocean Disposal Permit Program is funded at about 50 percent of the resources needed. Based on current conditions, the Program Manager feels that these resource estimates are accurate.

11. Wetlands/Habitats Loss: ranking=2 (initial ranking=3)

The dredge and fill program is currently funded at about 20 percent of the resources needed to do a complete job, according to the Program Manager. This includes resources shifted from other Water Management Division programs into the wetlands program. A limited amount of funding also is available under the Superfund Office of Water program elements to address wetland impacts at Superfund sites.

12. Drinking Water: ranking=2
(initial ranking=3)

The Public Water System Supervision Program Assistance funds about 35 percent of the resources needed to do an effective job. The Drinking Water Enforcement Program provides limited funding for this effort along with the Superfund Office of Water program. The latter two programs provide approximately 75 percent and 50 percent, respectively, of the resources needed. The Water Management Division shifts additional resources from other programs to this area, and the Program Manager feels that the program is underfunded.

13. RCRA Waste Sites: ranking=2
(initial ranking=2)

The RCRA Program Subtitle C facilities are funded by Hazardous Waste Management Strategy Implementation, A80D2D, and Hazardous Waste Enforcement, AGDD3A. This program regulates land disposal and storage and treatment facilities, hazardous-waste incinerators, and hazardous-waste generators at both operating and closed facilities. Almost all the resources allocated for these programs, however, are used to address land disposal, storage and treatment facilities, and hazardous-waste incinerators, with very little effort currently allocated to address generators. New England has approximately 2 percent of the total national universe of closed storage and treatment facilities and incinerators, 9 percent of the closed land disposal facilities, and about 3 percent of the operating facilities in these categories. It is anticipated that these facilities would be regulated over a five-year period and that only 20 percent of the facilities would have regulatory action within any one year. The available resources, however, are only sufficient to address 2 percent of the facilities. Therefore, this program is only funded at 10 percent of the total need. In addition, Region I has approximately 15 percent of the national universe of hazardous-waste generators; additional resources would be required to adequately address these facilities.

14. Superfund Waste Sites: ranking=4
(initial ranking=5)

Inactive and abandoned hazardous waste disposal sites covered by the Superfund are funded through the Hazardous Substance Technical Enforcement Program Element TGBY3A and Hazardous Substances Spill & Site Response Program Element TFAY9A, with the exception of the resources identified under accidental releases. These resources are used primarily to address sites on the National Priorities List (NPL) or to assess sites for future

NPL listing and cover both remedial and removal actions. The total need identified in these workload models is an additional 7 percent above the current resources. The Program Manager does not feel that this is a true estimate of total needs for several reasons. First, the program is not very mature, the pricing factors have not been tested, and pricing factors generally start low in new programs. Second, the Superfund Program has been subject to many changes; therefore, it has been difficult to define the actual workload. Last, the Superfund Program is subject to significant public and political involvement, which tends to consume large amounts of resources. In fact, the Superfund Program receives about 90 percent of the total number of Freedom of Information Act requests received by Region I.

This category also covers waste sites that may be addressed by the states. It is assumed for this analysis that very limited EPA resources would be associated with these state actions, other than for the state-led projects on the NPL.

15. Municipal Waste Sites: ranking=1 (initial ranking=1)

Region I did not receive funds to address RCRA Subtitle D facilities in FY88. It is estimated that the national universe of municipal landfills is approximately 9,300. The Program Manager estimates Region I's share to be about 5 percent. Municipal sludge and waste incinerators are regulated by the Clean Air Act and are covered under problem areas #1 and #2. In FY89, Region I will receive 2 work-years to address RCRA Subtitle D facilities, both municipal as well as other facilities. Given the large number of facilities and the minimum to no resources allocated to this problem area, an assigned ranking of 1 was given to this problem area.

16. Industrial Waste Sites: ranking=1 (initial ranking=1)

A small portion of the Toxic Substances Enforcement Program Element, AFLL3A, could be put into this problem area to address waste sites, primarily dealing with PCBs. However, since the majority of the program deals with direct consumer contact with products, no resources from that program were included here. It is estimated that there are more than 200,000 Subtitle D Facilities nationally, other than municipal landfills, of which approximately 5 percent are in Region I. It is assumed that these nonhazardous facilities would fall into this problem area. Currently, Region I receives no funds to address these sites. In FY89, Region I will receive 2.0 FTEs to address Subtitle D facilities--municipal systems as well as these other facilities. Therefore, as with problem area #15, this problem area was assigned a ranking of 1.

17. Accidental Releases: ranking=3
(initial ranking=3)

Region I addresses accidental releases through the region's Emergency Response Team. This team is funded by the Environmental Emergency Response and Prevention Program Element A51B2D, Oil Spills, under Section 311 of the Clean Water Act and by a small portion (approximately 13 percent) of the Hazardous Substance Spill and Site Response program element for chemical spills and other accidental releases to the environment. The total amount of resources needed for this program is difficult to assess, due to the nature of the activity and its dependance on the number of spills and accidents identified. The only indication of resources needed is obtained by examining historical records. In FY87, about one-third of the removal actions were classified as emergency releases or spills. In addition, this program has historically utilized about 125 percent of resources allocated. These additional resources were used to address 25 percent more sites than planned, and the Program Manager feels that additional sites could have been addressed if resources were available. Another limiting factor is that the budget was cut $30 million nationally in FY88.

Through Title III of SARA and a small portion of the Oil Spills Program, EPA is developing up-front planning programs to address these accidental releases through education and planning in order to maximize site cleanup and to minimize the number of releases. These programs are funded under Emergency Planning and Community Right to Know, APUD9G, and a small portion of A51B2D, Oil Spills. Minimal resources have been allocated to these programs. The Emergency Planning and Community Right to Know Program, for example, is only funded at 11 percent of the total needed, according to Headquarters estimates. The problem area was, therefore, estimated overall at the 50 percent level.

18. Releases from Storage Tanks: ranking=4
(initial ranking=2)

Underground storage tanks regulated by RCRA are funded by program element APCD2B-UST-Regs, Guides and Policies. Cleanup of leaking underground tanks is funded through the LUST (Leaking Underground Storage Tanks) Trust Fund under SARA and program element FPYV2B-HQ's Guidelines-LUST. Headquarters' original estimate of total need for this program was 625 percent higher than current funding levels. However, the Program Manager feels that the funding levels are adequate since the initial estimates were based on all states participating in the program. The work group agreed with the Program Manager and felt that this program, since adequately funded, should be given a ranking of at least 4. The program is expected to be a delegated state-run program with little direct regulatory action by EPA.

19. Other Ground-Water Contamination: ranking=2 (initial ranking=3)

The Underground Injection Control Program (UIC) and the Ground-Water Protection Program are funded at 45 percent and 28 percent, respectively, according to national models. The UIC program in New England reviews Class V wells that inject nonhazardous wastes into ground water. The Ground-Water Protection Program is a top EPA priority that is severely underfunded, according to the Program Manager. This latter program is directed toward coordinating agency-wide efforts to protect ground water. It is pro-active rather than reactive. The Drinking Water Enforcement Program Element provides a small amount of resources to pursue Class V UIC violations. The Water Management Division shifts additional resources from other programs to this area.

20. Pesticide Residues on Foods: ranking=3 (initial ranking=3)

See discussion under problem area #21.

21. Pesticide Application: ranking=3 (initial ranking=3)

Review of the Pesticide Enforcement Workload Model for AFKE3A and the Pesticide Certification and Training resource distribution for APFE3A, and discussion with the Program Manager resulted in an inability to adequately break down these resources into the two problem areas. Therefore, the total pesticide program was reviewed and ranked as one problem area. There is no estimate of total need for the program. The Program Manager felt that the current resources were between 25 percent to 50 percent of the total need. EPA has severely understaffed the enforcement or regional portion of this program. Headquarters receives about 600 wy to review, register, and develop labeling requirements for pesticides, yet only allocates about 100 wy to the 10 regions to carry out an enforcement and training program.

22. Lead: ranking=3 (initial ranking=3)

Region I does not receive any resources directly from the national allocation to fund a program addressing risks associated with exposure to lead in soil. However, the region has shifted resources, about 2 to 3 wy, to support a program and to administer a demonstration project under SARA. The Program Manager feels that these resources are 50 percent of the total resources needed to adequately implement this project, including field oversight and laboratory support. Future resources will depend on the results of the demonstration project. This portion of the problem would rank 2.

Lead in drinking water is regulated as a primary standard under the SDWA as well as by implementation of a provision of the 1986 SDWA Amendments that ban the use of lead solders, flux, and pipes. The resources to address lead as a primary drinking water standard are included in problem area #12, Drinking Water. The lead ban provision is to be implemented by the states; therefore minimal EPA resources would be needed. The Drinking Water Program ranked 2 overall, and a 2 ranking would be included for this portion of the problem.

Lead in air from both mobile and stationary sources regulated under the Clean Air Act and the resources needed to address this problem are included in problem area #1, Criteria Air Pollutants. Criteria Air Pollutants ranked 4; therefore, the lead in air portion of the problem should be ranked 4.

An overall average ranking for this problem area is, therefore, 3.

23. Asbestos: ranking=3 (initial ranking=4)

Region I receives 1.3 wy out of the Toxic Substances Enforcement Workload Model AFLL3A to oversee the Asbestos in School Program. This program is primarily implemented through contract dollars, which fund inspectors hired through the American Association of Retired Persons. The FTE resources are currently funded at about 50 percent of the total need, according to the Program Manager. The contract dollars have decreased slightly over the past several years and are about 75 percent of the total need for the program.

The region receives 4.7 wy out of the Stationary Source Workload Model AFHA3A to address National Emission Standards for Hazardous Air Pollutants (NESHAP). NESHAPs work in Region I is almost solely asbestos-demolition/renovation related activities. The total need from this model is predicted at 9.7 wy. Region I currently utilizes an additional 1.0 FTE, funded by regional contract dollars, to support this program. The Program Manager feels that the total resource needs would be adequate if all the states had delegated programs, but three states are not currently delegated. The primary activities supported by the current resource allocation are training, auditing, and oversight.

24. Lakes, Ponds, and Impoundments: ranking=3 (initial ranking=3)

A small portion of the Water Quality Management Program is directed toward lakes and ponds. The overall Water Quality Management Workload Model is estimated to be 80 percent funded. However, the Program Manager believes that the portion of the program funding lakes and ponds is only about 50 percent funded. Therefore, the ranking is a 3.

Attachment III-A

Summary of Available Resources Factor Rankings

		FY88 Operating Plan		**Total Need**			
Problem Area	**Program Element**	***National Resources***	***Region I Resources***	***National***	***Region I***	**Ranking**	**Adjusted Ranking**
1. Criteria Air Pollutants	A2OA2D (86%)	247.9	21.1	396.8	34.6	4	4
	A23A2F (88%)	79.8	6.6	109.9	9.5		
	AFHA3A (73%)	197.1	12.7	345.8	26.2		
	Total	524.8	40.5	852.5	70.3		
2. Acid Deposition and Visibility	A2OA2D (03%)	8.6	0.7	13.8	1.2	4	2
3. Hazardous/ Toxic Air Pollutants	A2OA2D (09%)	25.9	2.2	41.5	3.6	4	3
	A23A2F (12%)	10.9	0.9	15.0	1.3		
	TPXY9F+TG13Y3A	13.0	0.8+0.2		2.0		
	Total	49.8	4.1		6.9		
4. Radon	ATKF2D (02%)	13.8	1.4		3.0	3	3
5. Indoor Air Pollutants Other than Radon	A2OA2D (02%)	5.8	0.5	9.2	0.8	4	3
6. Radiation from Sources Other than Radon	ASYF2D	6.9	0.3		0.3*	5	5
7. Industrial Point Source Discharges to Surface Waters	AFEB3A (50%)	190.1	16.9			3	3
	AFDB3B (50%)	146.1	16.1			4	
	AHXB2D (30%)	25.6	2.4			4	
	A7XB2D (50%)	26.8	1.9			4	
	A53B2F (50%)	67.9	6.0	162.8	12.2	3	
	NAD2B	35.4	1.4			4	

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*Program Manager's estimate.

(continued)

Attachment III-A (continued)

Summary of Available Resources Factor Rankings

Problem Area	Program Element	FY88 Operating Plan		Total Need		Ranking	Adjusted Ranking
		National Resources	*Region I Resources*	*National*	*Region I*		
8. POTW Discharges to Surface Waters	AFEB3A (50%)	190.1	17.0			3	
	AFDB3B (50%)	146.1	16.1			4	
	A54B26	353.0	29.6	485.2	55.3	4	
	A56B2G	26.8	2.6			4	4
	AHXB2A (30%)	25.6	2.4			4	
	A7XB2D (50%)	26.8	2.0			4	
	A53B2F (50%)	67.8	6.0	162.7	12.1	3	
9. Nonpoint Source Discharges to Surface Waters	AHXB2A (25%)	21.3	2.0			4	3
10. Discharges to Estuaries, Coastal Waters, and Oceans from All Sources	AMLB2F	61.5	11.0			4	4
	A49B2D	30.2	3.0			3	
11. Wetlands/ Habitat Loss	AGMB2D	80.6	6.1			3	2
	TPRY9F	4.2	0.3			3	
12. Drinking Water	A70C2D	121.1	9.7	344.9	27.7	3	
	AFFC3A	43.2	1.8	55.0	2.6	4	2
	TPRY9F	16.8	1.3			3	
13. RCRA Waste Sites	A80D2D	376.7	32.6				
	AGD3A	427.8	32.5				
	Total	804.5	65.1	8045*	660*	2	2

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*Program Manager's estimate.

(continued)

Attachment III-A (continued)

Summary of Available Resources Factor Rankings

Problem Area	Program Element	FY88 Operating Plan *National Resources*	 *Region I Resources*	Total Need *National*	 *Region I*	Ranking	Adjusted Ranking
14. Superfund Waste Sites	TFAY9Q	850.0+	62.7	924.0+			
	TGBY3A	606.0+	44.2	627.0+			
(+FY89)	Total	1,456.0		1,551.0		5	4
15. Municipal Waste Sites			0			1	1
16. Industrial Waste Sites	AFLL3A					1	1
17. Accidental Releases	A51B2D	41.2	3.9		4.8	3	3
	TFAY9A (13%)		8.0		10.0*		
	APUD9G	11.8	1.2		10.5		
	Total		13.1		25.3		
18. Releases from Storage Tanks	APCD2B	39.6	4.3				
	FPYV2B	41.0	4.0				
	Total	80.6	8.3	500*		2	4
19. Other Ground-Water Contamination	A71C2D	145.3	4.5	314.5	12.8	3	2
	AFFC3A (45%)	35.3	0.9	52.1	1.7	4	
	AMMC2E	51.4	5.2	181.2	19.3	3	
20. Pesticide Residues on Foods	ADKE3A	81.0	4.0			3	3
	APFE3A	19.4	1.7				
	Total	100.4	5.7				

*Program Manager's estimate.

(continued)

Attachment III-A (continued)

Summary of Available Resources Factor Rankings

		FY88 Operating Plan		Total Need			
Problem Area	Program Element	*National Resources*	*Region I Resources*	*National*	*Region I*	Ranking	Adjusted Ranking
21. Pesticide Application	AFKE3A APFE3A					3	3
22. Lead	Lead-in-Soil		2-3*		4-7*	3	3
23. Asbestos	AFLL3A (02%) AFHA3A (27%)	72.9	1.3 4.7	127.9	2.6 9.7	4	3
	Total		6.0		12.3		
24. Lakes, Ponds, and Impoundments	AHXB2A (15%)	12.7	1.2			3	3

*Program Manager's Estimate.

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IV. Economic Impact Factor

Definition of Factor/Background

The economic impact factor of risk management evaluates the cost of controlling each environmental problem. The cost is presented as the total cost to Region I. The bearer of the cost is, in most cases, noted in the narrative below; however, this consideration did not influence the final ranking of the problem.

Sources of Information

The economic analysis depended primarily on cost data provided by Temple, Barker, & Sloane, Inc. (TBS). The data were developed for EPA, to support various regulatory impact analyses. Where other data sources were utilized, references are provided in the narrative.

Ranking Criteria and Adjustment Factors

Problems that had a relatively low control cost received a high ranking, as the work group decided that, for all factors, a score of 5 would indicate that the problem was "easier" to manage. The ranking scores and the costs associated with each score are as follows:

1. More than $1 billion
2. $100 million to $999 million
3. $10 million to $99.99 million
4. $1 million to $9.99 million
5. Less than $1 million

Several assumptions about the data and the evaluation criteria also were made:

1. Data supplied by TBS are sufficient and of good quality unless reports stated otherwise. In the absence of data, professional judgment and knowledge were used to establish a rating.

2. When the cost data were given in terms of a national profile, New England's share was determined to be 10 percent of that total.

3. The population of New England is estimated to be approximately 13 million.

4. Where several control options are listed, the "average" cost control option was used for ranking the problem area. That is, in selecting a control option for economic evaluation, the effective technology with the medium price tag was chosen.

5. When the cost data were presented in ranges, the upper end of the range was used in the ranking process.

6. Ranks are based on problem area costs identified in the present. That is, projected cost of the problem in the future was not considered.

7. The bearer of the cost was not considered in the final ranking; i.e., there was no adjustment based on the bearer.

8. If cost data were not annualized, annualized cost was calculated based upon a 20-year payback at 9 percent interest.

9. The ranks are based on the annual cost of addressing each problem areas.

Depending on how much of the problem was addressed by the cost data, the problem area ranking then was adjusted up or down by one rank. If the cost data addressed less than 25 percent of the problem, the rating was decreased by one rank. Also, if the work group judged the cost data to be overestimates, an adjustment was made to increase the rating by one rank.

Conclusions and Recommendations

- Economic analyses from Regulatory Impact Analysis studies may not be an appropriate data source for economic impact assessments. Actual cost profiles would be more meaningful.

- Even though the economic evaluations attempted to tailor the national data to reflect the New England situation, using national data may not be appropriate for all problem areas. In future projects, national data should be validated if no New England data are available.

- Each program office should identify key data sources that provide economic analyses of environmental activities within each problem area.

Problem Area Assessments and Rankings

1. Criteria Air Pollutants: ranking = 1

The Clean Air Act gives EPA statutory authority to control air pollution. Its main objective is the attainment and maintenance of the National Ambient Air Quality Standards (NAAQS) for the protection of public health and welfare. Standards exist for six pollutants: sulfur dioxide (SO_2), total suspended particulates (TSP), carbon monoxide (CO), ozone (O_3), nitrogen dioxide (NO_2), and lead. The control options and environmental benefits are summarized below:

A. Combustion technologies: Primary benefits include the reduction of SO_2 and NO_2 emissions.

B. Fuel desulfurization: Primary benefit is the reduction of SO_2 emissions.

C. Emission standards for motor vehicles: Primary benefits include reductions in CO, TSP, NO_2, and volatile organic compounds (VOCs) (precursors to O_3) emissions.

D. Other methods to reduce CO, TSP, NO_2, and VOCs are as follows:

  1. Inspection/maintenance (I/M) programs
  2. Alternative fuels use
  3. Emission controls on gasoline pumps
  4. Volatility restrictions on gasoline
  5. Expanded Reasonably Available Control Technology (RACT) standards for stationary sources
  6. Emission standards for other commercial products
  7. Onboard hydrocarbon controls

Various control strategies for which cost data exist are as follows:

A. Power plants: Reduce SO_2 emissions by 50 percent by the year 2000. The estimated cost is \$6.2 billion to \$8.5 billion per year for scrubbers nationally. New England's maximum estimated cost is \$850 million per year.

B. Mobile Sources:

1. Emissions standards for autos: Reduce CO, TSP, NO_2 and VOC (precursors to O_3) emissions. The estimated cost is $250 per unit. The total national cost is estimated to be $1.1 billion/year. The New England maximum cost is estimated to be $110 million/year.

2. Sulfur removal from diesel fuel: Congress has proposed to reduce SO_2 emissions by lowering the level of sulfur allowed in diesel fuel from 0.27 percent to 0.05 percent. Annual cost is estimated to be $340 million to remove 285,000 tons of sulfur ($1,200/ton). The Office of Technology Assessment estimates the cost to the consumer to be an additional $0.03/gallon.

3. VOC annual emissions: Applying the hydrocarbon reduction measures and improved I/M programs will reduce emissions in 1993 by 3.5 million tons. The total cost (national) for this reduction is estimated to be $7.9 billion to $8.7 billion/year. The maximum cost for New England is estimated at $870 million/year.

   Limits on gasoline volatility would reduce VOC emissions by 1.2 million tons/year. The cost is estimated to be $100 million to $225 million/year. The New England maximum cost is estimated to be $22.5 million.

C. Stationary Sources:

1. The cost of Reasonably Available Control Technology (RACT) on large point sources (lower NO_2 levels) and utility boilers in ozone nonattainment areas is $400 million/year. New England's maximum cost is estimated to be $40 million/year.

2. Gas pump controls (stage II vapor recovery) would reduce VOC emissions by 1.2 million tons/year at a national estimated cost of $170 million/year. The New England cost would be $17 million/year.

Summary: The total cost for controlling criteria air pollutants in New England is approximately $1.9 billion/year. This annualized cost is based upon a summation of annual costs listed in items A, B, and C.

2. *Acid Deposition and Visibility: ranking = 3*

According to EPA Region I's "1986 Year In Review," national funding for acid rain research was an estimated $87 million in 1987. More than $2.9 billion will be spent on clean coal technology by 1991. The New England cost is estimated to be $290 million; the annual cost (over a five-year period) would be approximately $60 million.

3. *Hazardous/Toxic Air Pollutants: ranking=1*

Hazardous air pollutants are controlled with the same technologies used to abate criteria air pollutants. Proposed amendments to the Clean Air Act would require Best Available Technology for all major sources of hazardous air pollutants. Area source emissions would be reduced by 55 percent over the next 10 years. Costs and effects are preliminary at this time.

Technology-based standards on major sources and area source controls are estimated to cost $8 billion to $15 billion/year nationally; the environmental benefits would include reduction of VOC emissions by 7 million to 10 million tons per year. The New England cost is estimated to be $1.5 billion/year.

4. *Radon: ranking=3*

The discussion below focuses on the detection and remediation efforts needed to control radon in buildings. Two monitoring devices, charcoal canisters and alpha track detectors, are relatively inexpensive, fast, and simple to use by homeowners testing radon concentrations. For a majority of homes where remediation is needed, ventilation will be adequate to reduce radon levels below the EPA action criteria.

Based on regulatory impact analyses completed for EPA, an estimated 10,000 fewer cancer cases will result with the implementation of appropriate remediation efforts.

Screening Programs

These efforts will identify homes at greatest risk from radon. An estimated 7.6 million homes--9 percent of all homes in the United States--have radon concentrations in the 4 to 20 pCi/l range.

The National Screening Program for radon in air costs $2 billion. New England's share of the cost is $200 million. Annualized cost would be $21.9 million/year.

The National Screening Program for water also costs $2 billion. New England's cost is $200 million. Annualized cost would be $21.9 million/year.

Remediation

Ventilation. The EPA recommends ventilation of homes with radon concentrations at low levels (<20 pCi/l). National cost is estimated at $1.9 billion for this remediation. The New England cost is approximately $190 million, for an estimated 2.5 million households affected in New England. Annualized cost is estimated to be $20.8 million.

Sub-slab suction. For high radon levels (>20 pCi/l), the Agency recommends a more elaborate remediation method, such as sub-slab suction. Approximately 0.5 percent of the affected homes require such elaborate methods. National cost is estimated to be $425 million. New England's cost is $42.5 million. Annualized cost would be $4.65 million.

Granular activated carbon (water). Activated carbon treatment is a common mitigation measure to remove radon from water. Available information suggests that a cost of $1,000 for each affected home is reasonable. By estimating that 0.05 percent of the affected homes in New England would require remediation, an estimate of $1 million for the Region I cost would be reasonable. The annualized cost would be $110,000.

Summary: The total economic impact would be $633.5 million, with an annualized cost of $69.4 million per year.

5. Indoor Air Pollutants Other than Radon: not ranked

Indoor air pollution is often remedied through good ventilation design and by providing adequate maintenance and operation of the ventilation system. Controls vary in scope and complexity. Costs for engineering and for operational controls vary widely. No specific cost data were available. Therefore, economic impact rating was not provided for this category.

6. Radiation from Sources Other than Radon: ranking=5

The intended public benefit from this category is to limit the exposure to non-ionizing radiation, specifically radio frequency radiation. A number of studies addressing this concern have been conducted by EPA's Office of Radiation Programs during the past 12 years. Based on a review of control options, which include extending fenced-off areas and warning signs, the economic impact analysis has selected the control level to be 100 uW/cm^2 for establishing comparable cost estimates. The national cost for achieving the preferred control option is $68.8 million; the New England cost is approximately $6.9 million. The annual cost would be approximately $700,000.

7. Industrial Point Source Discharges to Surface Waters: ranking=3

Control costs are provided in the form of dollars per pound-equivalent ($/lb-eq) for toxic and conventional pollutant control of both direct and indirect discharges. The controls ensure compliance with previously established effluent limitations. The lb-eq measure provides a means to compare actual treatment costs for each pollutant, using copper as a weight standard. It is the product of the atomic weight ratio (copper standard/pollutant metal) multiplied by the measured weight of the pollutant metal.

An estimated 9 percent of industrial discharges are not in compliance with effluent limitations. An analysis of contractor data that provided estimates of pollutant removal (in lb/eq) and unit costs(in $/lb/eq) suggests that $2.2 billion (nationally) is needed to ensure compliance on NPDES permits. The New England cost is estimated to be $220 million, with annual cost estimated at $24.1 million/year.

8. POTW Discharges to Surface Waters: ranking=2

Available cost data from the EPA 1986 Needs Survey cover a wide range of costs for various categories of infrastructure, including wastewater treatment facilities (such as secondary and advanced wastewater treatment), new interceptor and collector sewers, infiltration/inflow correction, rehabilitation/replacement of sewers, and combined sewer overflow correction. The estimates below cover those cost categories that have traditionally been added together for purposes of assessing POTW (publicly owned treatment works) needs by the Construction Grants program: (1) Category I, Secondary Treatment; (2) Category II, Advance Treatment; (3) Category IIIB, Infiltration/Inflow Correction; and (4) Category IVA, New Interceptor Sewers. The state-by-state summary is as follows (in millions of dollars):

Massachusetts	$2,083
Connecticut	420
Rhode Island	127
New Hampshire	354
Maine	191
Vermont	70
TOTAL	$3,245

The total estimated cost for controlling POTW discharges to surface waters is $3.2 billion. It is assumed that costs for the Boston Harbor project, estimated to exceed $1 billion, are included in this estimate. Therefore, the total will be reduced by $1 billion (to be applied under problem area #10), and the corrected total estimate is $2.2 billion. The annualized cost is estimated to be $246 million per year.

9. Nonpoint Source Discharges to Surface Waters: ranking=2

Nonpoint source (NPS) pollution is a significant cause of the remaining water quality problems in the nation. NPS pollution can lead to some human health risk, but ecological risk and welfare efforts are the primary concerns. NPS discharges to surface waters include a wide array of pollutants and effects, such as traditional concerns about cancer risks from pesticides, ecological damage from sediments, and nutrient runoff. Controls generally focus on changes in behavior patterns that alter the use of potential contaminants. The following summary of control options provides limited cost data:

Conservation tillage. The traditional approach to growing crops is to till the entire field. Conservation tillage involves tilling only a portion of the field. The average cost has been estimated to be $30/acre. The national cost is estimated to be $4 billion/year; the New England cost is estimated at $400 million/year. It is likely that this estimate is high, based on the tillable acreage available in the region.

Feedlot management. Feedlots can improve management of the animal wastes generated at those facilities. The national cost has been estimated at $2 billion/year. The New England share is estimated to be $200 million/year. It is likely that this cost is high, considering the feedlot activity in New England.

Other Best Management Practices (BMPs). This broad category includes BMPs associated with mining, construction, and silviculture. Specific national cost data were not available for these categories.

The total estimated New England cost for control of NPS discharges is $600 million/year. The initial rating of 2 may be an overestimation due to the amount of conservation tillage and feedlot management in New England. However, there may be an underestimation of the cost related to the Best Management Practices as a result of the lack of data. Since these two extremes cancel any adjustment factors, the ranking will remain the same.

10. Discharges to Estuaries, Coastal Waters, and Oceans from All Sources: ranking=2

As noted in problem area #8, the 1986 EPA Needs Survey did not disaggregate capital costs for POTW discharges to marine waters. The estimate shown below does include costs for combined sewer overflow correction in New England (except Vermont). It is assumed (subject to limitations) that the vast majority of costs for combined sewer management would contribute to the improvement of coastal water. The state-by-state summary is as follows (in millions of dollars):

Massachusetts	$1,103
Connecticut	381
Rhode Island	201
New Hampshire	225
Maine	19
Total	$1,929

The total estimated need for combined sewer overflow correction (excluding Vermont) to control discharges to estuaries, coastal waters, and oceans is approximately $2 billion. The annualized cost for this problem area is $211 million/year.

11. Wetlands/Habitat Loss: not ranked

No control strategies or cost data were available. Therefore, no ranking could be established for this category.

12. Drinking Water: ranking = 3

According to the Federal Reporting Data System (FRDS), New England has 13,885 public water supplies (PWS) serving a population of 12,748,000 people. The control costs for the facilities to meet Primary Drinking Water Regulations are listed below:

Volatile organic chemicals	National:	$23.1M
	New England:	2.3M
Synthetic organic chemicals	National:	$34.6M
	New England:	3.5M
Trihalomethane	National:	$118.0M
	New England:	12.0M
Inorganics	National:	$37.0M
	New England:	4.0M
Radionuclides	Home treatment:	$400 to $800 for GAC
		$900 for aeration

Approximately 2 to 3 percent of the homes served by PWS are affected by radionuclides, and 10 to 15 percent of residential dwellings are affected. These residential dwellings are homes with a private water supply source such as a privately owned well. Therefore, assuming 3.25 million households in New England and 97,500 homes served by PWS, approximately 12,500 residential dwellings are affected by radionuclides. Using an average cost of $600 for home treatment, the total cost to control radionuclides would be approximately $66 million.

Total cost for remediation of drinking-water problems would be $87.8 million per year, with 75 percent of that cost representing the cost of individual homeowner treatment of radionuclides.

13. RCRA Waste Sites: ranking = 3

Corrective Action

Limited corrective action cost data were available through the contractor. We assumed that total cleanup costs for a RCRA site will be approximately 50 percent of that for a Superfund site.

According to the Regional RCRA Office, 27 sites are presently under investigation for corrective action. Region I estimates that 200 sites could ultimately qualify for corrective action, but the assessment will be based on present--not projected--problems. The average cost for complete cleanup is estimated to be $15 million to $20 million per site. Therefore, the cost estimate is $540 million for corrective action at these sites. There are also oversight costs associated with correction; e.g., development of an investigation study and design of the selected alternative. The cost of these activities is several orders of magnitude less than the remediation (cleanup) costs; therefore, these oversight costs did not affect the final figure for corrective action activities. The annualized cost for corrective action is estimated to be approximately $60 million/year.

Incineration

The performance-based standards are for control measures with 99.99 percent destruction and removal efficiencies (DRE) of organics. Nationally, there are 350 incineration units, with an annual cost of $15 million. In addition, the risk-based standards for metals, HCL, and CO emissions affect 200 units at costs of $10 million to $20 million/yr.

In New England, there are two incinerators with interim status and one proposed for permit decision. Therefore, the realistic number of RCRA hazardous waste incinerators presently in Region I is three, which makes the total cost (at $40,000 for DRE and $100,000 for metals for each incinerator) $420,000.

The facilities will have to absorb the initial cost of construction as well as Operation and Maintenance costs. However, some of this will be passed on to the consumer at a later point.

Land Disposal Restrictions (Pretreatment)

Nationally, there are approximately 300 facilities for land disposal of wastes. The cost for these facilities varies with the requirements for specific listed wastes. The terms "California" and "1st thirds list" refer to specific RCRA waste streams and the order in which they are being evaluated relative to land disposal. The national cost data are as follows:

Requirement	Annual Costs in Millions of Dollars *National*	 *Cost/Facility*
California list statutory with Best Demonstrated Available Technology (BDAT)	$132.0	$0.4
California list "EP" levels with BDAT	783.0	2.6
Most of "1st thirds list" of hazardous constituents with BDAT	333.0	1.1
All of "1st thirds list" with BDAT	341.0	1.1
Solvents with average risk reduced to 1×10^{-12}	46.0	0.1

There are three land disposal facilities in New England. The annualized cost for those three facilities, under the requirements listed, are:

Requirement	Cost in Millions of Dollars
California list statutory with BDAT	$1.2
California list "EP" levels with BDAT	7.8
Most of "1st thirds" with DBAT	3.3
All of "1st thirds" with BDAT	3.3
Solvents restrictions	0.3

Presently, in order to meet regulations, compliance with the "1st thirds" and solvents restrictions standards is required. Thus, the cost for land disposal restrictions is $6.9 million/yr.

Summary. The total cost for Region I as it pertains to RCRA waste sites is approximately $67.4 million/year.

14. Superfund Waste Sites: ranking = 2

Currently, a total of 951 sites on EPA's National Priorities List (NPL) are eligible for long-term remedial action. Out of that total, approximately 60 NPL sites are located in New England (as of early June 1988). The common control options for remediating these Superfund sites include:

- Containment of waste
  - Capping with an impermeable material to prevent leaching
  - Constructing slurry walls to restrict ground-water movement
- Treatment of waste
  - Ground-water treatment methods such as carbon adsorption or in-situ biodegradation
  - Excavation and dechlorination of soil to remove chlorinated organics such as PCBs
- Destruction of waste through thermal treatment (i.e., incineration)

The estimated average costs for site cleanups range from $30 million to $40 million. Average cost per site under the Superfund Amendments and Reauthorization Act (SARA) provisions is $35 million. Therefore, the cost for New England to clean up all NPL sites would be $2.1 billion. If EPA is able to identify a party legally responsible for the contamination, that party bears the cleanup costs. Otherwise it is the responsibility of the federal and state governments. The annual cost is estimated to be $230 million/year.

15. Municipal Waste Sites: ranking = 2

As noted by the Region I Waste Management Division, there are approximately 9,300 municipal waste sites nationwide. Five percent of the national total are in New England; therefore, there are approximately 465 municipal waste facilities in Region I. The economic impact evaluation considered the following operations:

- Solid waste landfills

  To meet criteria promulgated, the following "average cost" alternative was selected: ground-water monitoring, corrective action, post-closure care, and installation of a leachate collection system at selected facilities, with liners and covers to minimize infiltration into the unit. For this alternative, the cost per landfill annually is $146,000. This makes a total cost of $65 million/year for municipal landfills in Region I.

- Solid waste incinerators

  Currently, existing facilities spend, collectively, $119 million to $195 million (annualized incremental cost) for 111 combustion facilities, or $1 million to $1.7 million per facility. There are 40 operating municipal solid waste incinerators in New England. Therefore, total annual cost for Region I ranges from $40 million to $68 million.

- Recycling of municipal solid wastes

  No cost data were given. It is anticipated that there will be tremendous saving from both the handling of solid wastes as well as the preserving of natural resources for a comparatively small amount of capital expenditures.

Summary: The solid waste landfills and the incinerators cover most of the problem. Thus, the cost to Region I is approximately $133 million/year.

16. Industrial Waste Sites: ranking = 3

According to the Region I Waste Management Division, there are approximately 200,000 of these facilities nationally. Of that total, 5 percent are in Region I. Therefore, in New England there are approximately 10,000 facilities. Assessment of costs for those facilities follows:

- Solid waste landfills

  If the same alternative identified for municipal landfills is used (see problem area #15), then the incremental annualized cost for all of these landfills nationally is $204 million. New England's cost is approximately $10 million/year, which reflects 5 percent of the national incremental annualized cost (incremental cost includes base cost for the alternative plus average cost for disposal and for households).

- Solid waste incinerators

  TBS provided no data regarding the number of industrial solid waste incinerators. The program office does not track these facilities, but considers them a small portion compared to landfills.

Summary: We assume that the solid waste landfills represent the majority of the solid waste (industrial) problem. Therefore, the total cost to Region I is $10 million per year.

17. Accidental Releases: ranking = 4

The CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act of 1980) Removal Program manages the response to accidental (emergency) releases. No specific cost data were submitted for review and evaluation. Cleanups under the Emergency Response Program are typically $50,000 to $1,000,000. In 1986 (the most recent available data), there were 79 incidents in New England. Therefore, the cost to New England for accidental releases would range from $3.95 million to $79 million. Assuming 1986 is a typical year and using an average cost per incident, the total cost to Region I would be approximately $40 million. The annualized cost would be $4.5 million.

18. Releases from Underground Storage Tanks: ranking = 2

Nationally, there are approximately 1.4 million tanks with 96 percent storing gasoline and petroleum products and the remaining 4 percent containing other chemicals. In New England, there are approximately 150,000 underground storage tanks.

In evaluating the cost, we used the EPA-recommended option. This option provided the highest incremental cost savings with the greatest percentage of plume area avoided. It also allowed for a greater flexibility in upgrading to new tank standards and time for requiring leak detection. The total annualized cost per tank is $3,457, making the total annualized cost for New England approximately $520 million/year. Tank owners would bear the costs.

19. Other Ground-Water Contamination: not ranked

No control or cost data were identified; therefore, it is not possible to assess the economic impact of this problem.

20. Pesticide Residues on Food: ranking = 4

Major sources of pesticides include agricultural, commercial, and private uses of insecticides, herbicides, fungicides, growth regulators, and rodenticides. There are approximately 650 food-use pesticides.

The various control options range from labeling foods treated with pesticides to cancelling a pesticide. The cost data supplied by TBS were based on a case study of the cancellation of ethylene dibromide (EDB). The EDB Case Study represents the most recent economic information regarding the problem of pesticide residues on food. Because the economics of labeling versus cancellation do not provide extremes of the spectrum, developing an average of these two costs would not be appropriate. We used a conservative approach by taking the data from EDB Case Study to provide a picture of the cost impacts from cancelling a pesticide.

The aggregate annual impacts resulting from this action range from $26.4 million to $42.8 million, depending on the efficiency of alternative pesticides. Using the 10 percent apportionment for New England, it is estimated that the regional cost would range from $2.6 million to $4.3 million, with both pesticide producers and consumers bearing the costs.

21. Pesticide Application: ranking = 4

The cost data for this problem area are based on feasible control options for the professionals who mix, load, and apply pesticides. According to the cost data, the potentially exposed population in this problem area is smaller than the population ingesting pesticide-tainted foods. Control costs include:

1. Chemical-resistant gloves at $10/pair
2. Disposable full body suits at $10 to $20 each
3. Modifying an open cab tractor for which, nationally, the conversion cost ranges from $1.25 billion to $5 billion. Assuming New England's share is 10 percent of that cost, the range would then be $125 million to $500 million for Region I, or an annual cost of $14 million to $55 million.

The conversion cost should represent the majority of the cost in this problem area. The cost bearers here are the applicators.

Summary: Since New England does not in reality represent 10 percent of the agricultural area, these cost figures are overestimates. Therefore, an adjustment was necessary. The original ranking was 3; with the adjustment the ranking increased by one ranking level, to 4.

22. Lead: ranking = 1

Costs and control options vary with the environmental medium. The cost associated with controlling lead in drinking water is presented in problem #12 (inorganics: New England = $3.7 million/yr) and lead in air is identified in problem #3 (technology-based standards: New England = $1,500 million/yr). For deleading homes, the cost to homeowners is approximately $10,000 per home. This figure is from a Baltimore survey and represents a totally lead-safe home; i.e., the removal of all lead-contained material in a home. However, to comply with Massachusetts' standards for deleading a home, which are the most stringent regulations in New England, the cost ranges from $3,500 to $4,000 per home. For soil remediation, the cost ranges from $3,000 to $5,000 per home. Generally, the bearer of these last two control options is the homeowner, whereas controlling lead in water and air would be the responsibility of the facility. The cost of controlling lead in food is unknown.

Of the homes in New England, approximately 400,000 to 1.26 million are affected by the problem of lead in homes and soil. Therefore, the cost for controlling this problem would be $3.2 billion to $10 billion.

Summary: The cost of controlling lead in all media would be approximately $5 billion to $11.5 billion, with most of the cost being borne by homeowners because the major portion of this cost comes from lead in soil. The annual cost is estimated to be $1.26 billion/year.

23. Asbestos: ranking = 2

All control strategies for asbestos-related activities must be consistent with state and federal requirements. There are 733,000 buildings (federal, commercial, and residential) nationally that would need asbestos control. The cost of control is approximately $17 billion, with most of these costs reflecting cleanup of federal and commercial buildings. Cost per building (federal or commercial) would be approximately $23,000. (The cost for asbestos removal in a residential home is approximately $1,500.)

In New England, 5,000 notifications have been issued regarding the need to comply with asbestos standards. Therefore, the total cost to New England for this problem is $115 million, with federal and commercial entities bearing the cost. This would represent the majority of the problem as well as the majority of the cost.

(Cost data were from the "EPA Study of Asbestos-Containing Material in Public Buildings," February 1988, and the program office.)

24. Lakes, Ponds, and Impoundments: not ranked

The effective technology or control option for this problem is lake restoration to improve water quality of these resources. Improvement measures include sediment removal, nutrient fixation with alum, and weed harvesting. No cost data associated with these activities were provided by either TBS or program offices. However, it is estimated that the cost for the aforementioned actions would be low, with the bearer of the cost being individual communities.

V. Legal Authority Factor

Definition of Factor/Background

For purposes of this report, "legal authority" refers to those statutory laws and regulations that address the various pollution problem areas defined by the Risk Management Work Group and that are implemented by EPA and/or the appropriate state agencies. The analysis of the legal authority reflects not only the existence or nonexistence of statutory and regulatory authority applicable to the 24 pollution problem areas, but also attempts to account for the adequacy, on its face, of any existing law, as well as past enforcement success. Both regulatory and enforcement-related provisions are taken into account by the ranking, because a law may authorize a comprehensive regulatory program but still be weak with respect to enforcement.

The ranking of each problem area was also affected by the adequacy, on their face, of regulations promulgated pursuant to statutory authorities. For example, in the Hazardous/Toxic Air Pollutants problem area, the Clean Air Act is sufficient on its face, but many air pollutants are currently not being controlled because regulations have not been written.

Sources of Information

The information contained in this paper was gained by reference to the laws themselves, as well as by discussions with both EPA attorneys and environmental scientists. An attempt was made to obtain detailed information about state law from Region I's Attorney Generals but, because of the time frame within which the report had to be concluded, the state offices were not able to respond.

Ranking Criteria and Adjustment Factors

The ranking criteria cover various levels of legal authority and implementation, as follows:

1: A ranking of "1" reflects the fact that there are no laws applicable to the pollution problem in question.

2: A ranking of "2" shows that the applicable state and/or federal laws are inadequate on their face.

3: A ranking of "3" reflects the fact that applicable state and/or federal law exists but has not been widely implemented.

4: A ranking of "4" shows that applicable federal and/or state law is adequate on its face and is widely implemented.

5: A ranking of "5" reflects not only the fact that the applicable federal and/or state law is adequate on its face and widely implemented, but also that EPA and/or the states have had enforcement success in the past, i.e., there is case law supporting EPA's or the states' positions.

Conclusions and Problem Issues

In reviewing this report on legal authorities, it should be understood that the rankings sometimes reflect an overall evaluation that had to take into account different laws for different media. Depending on the media involved, a particular legal authority considered on its own might receive a ranking that differed from those given to other applicable laws if they too were considered individually.

We were not able to gather as much detailed information concerning state law as may be desirable for an adequate appraisal of existing authorities. Moreover, local legal authorities were not addressed in the report due to the impracticability of obtaining sufficient knowledge about them. In certain cases, local law may be more stringent and effective than either state and/or federal law.

Also, the assessments of each problem area were based upon the existence or nonexistence of EPA and/or state implemented legal authorities, and were not affected by legal authorities implemented by other federal agencies. Although the report occasionally describes other federal agencies' authorities, we were not able to obtain as much information about these authorities as might be desirable, and one should not be misled, for instance, into thinking that a ranking of "1" signifies that absolutely no federal law exists. An example of this situation is the Indoor Air Pollutants category. Although this category received a ranking of "1" in the report, there are federal agencies other than EPA that do have authority over such pollutants.

Problem Area Assessments and Rankings

1. Criteria Air Pollutants: ranking = 5

Federal Statutory Law:	Clean Air Act (CAA)
Federal Regulations:	40 CFR Part 50 - National Primary and Secondary Ambient Air Quality Standards 40 CFR Part 51 - Requirements for Preparation, Adoption, and Submittal of Implementation Plans 40 CFR Part 52 - Approval and Promulgation of Implementation Plans

EPA has set primary and secondary standards for six criteria air pollutants: carbon monoxide, nitrogen oxides, lead, sulfur dioxides, ozone, and particulate matter. This list is to be revised from time to time: Every five years the Administrator must review criteria and the National Ambient Air Quality Standards (NAAQS) and make any necessary revisions.

The Clean Air Act (CAA) required each state to submit to the Administrator, within nine months after the promulgation of National Ambient Air Quality Standards, a plan providing for the implementation, maintenance, and enforcement of those primary and secondary standards in each air quality control region within the state. Included in Subpart D of the CAA is the requirement that attainment be accomplished as expeditiously as practicable but, in the case of National Primary Ambient Air Quality Standards, not later than December 31, 1982. An extension was permitted to December 31, 1987, for photochemical oxidants and carbon monoxide upon a showing that meeting the earlier deadline was impossible.

The state implementation plans were required to provide that after June 30, 1979, no major stationary source shall be constructed or modified in any nonattainment area if the source would emit the particular pollutant, unless the construction or modification plan met the requirements of Subpart D.

The major problem with the CAA, as it applies to this category, involves some of EPA's interpretations of its provisions. The provisions for sanctions to be imposed for state implementation plans (SIPs) that failed on their face or in practice were given a lenient interpretation. These decisions will affect the imposition of sanctions for noncompliance by the end of 1987 for ozone and carbon monoxide. The December 31, 1987, date referred to above has been designated by EPA as a target date only and not a legal date by which attainment must occur.

The CAA also lacks prescriptive requirements, an aspect that has both advantages and disadvantages with respect to criteria air pollutants. The lack of specific requirements gives states much flexibility in achieving attainment, which leads to greater state acceptance of and knowledge about the SIP. However, the Act assumes a high resource base on the part of states and the federal government, because states are required to take a leading role and EPA must review widely differing state technical solutions and plans from a legal and technical standpoint, requiring a broad base of experts.

Another problem with the CAA is the fact that Section 126 has been interpreted by the Agency and the relevant case law not to cover ozone transport. This is a significant problem on the East Coast. Region I's three southern states are nonattainment areas and New Hampshire and Maine often have illegal levels as well. Congress is presently aware of the need for a general interstate transport provision that would cover problems such as acid rain and ozone transport.

2. *Acid Deposition and Visibility: ranking = 1*

Acid Deposition

The pollutants that contribute to acid deposition, sulfur dioxide (SO_2) and nitrogen oxides, are themselves regulated under the Clean Air Act. However, deposition can occur even when emissions of these compounds meet EPA standards. No federal law currently applies directly to acid deposition itself. The Clean Air Act contains no clear authority to deal with acid rain because Section 126 of the Act has been interpreted to cover only interstate transport of air pollutants that causes a state to violate the transport portion of national ambient air quality standards (NAAQS), to exceed prevention of significant deterioration (PSD) increments, or to violate visibility requirements.

Several bills for acid deposition control are being considered by Congress, and a special Congressional appropriation enabled EPA to establish the State Acid Rain (STAR) program to identify and resolve potential problems with respect to future regulation. Studies are being funded in 36 states. The National Acid Precipitation Assessment Program, chaired jointly by EPA, the President's Council on Environmental Quality, the National Oceanic and Atmospheric Administration, and the Departments of Agriculture, Energy, and Interior, funds research to increase our knowledge of the causes and effects of acid rain.

In Region I, only Massachusetts and New Hampshire have addressed the problem of acid rain in legislation. New Hampshire currently has a law which calls for a 25 percent reduction statewide in the level of SO_2 by 1991. An additional 25 percent reduction by 1996 is called for only if federal legislation is enacted. Massachusetts currently has a law that calls for attainment of a certain level of SO_2 by 1995. Regulations are to be drafted by the Department of Environmental Quality Engineering before December 31, 1988.

Visibility

Federal Statutory Law:	Clean Air Act (CAA) 42 U.S.C.A. 7491
Federal Regulations:	40 CFR Part 52

This section of the CAA provides for the prevention of future impairment and the remediation of any existing impairment of visibility that results from manmade pollution in mandatory class I federal areas. Regulations have been promulgated by EPA in order to provide guidelines to the states. For state implementation plans there is a long-term (10 to 15 years) strategy for making reasonable progress toward meeting the national goal.

However, EPA's regulations implementing this section of the Act have not yet dealt with widespread regional haze-type visibility impairment caused in part by long-range transport of sulfates. EPA does not believe that the state-of-the-science is sufficiently mature to develop a regulatory program at this time. Further research is being conducted by EPA toward the goal of regulating regional haze in the future.

3. Hazardous/Toxic Air Pollutants: ranking = 3

Federal Statutory Law: Clean Air Act (CAA) 112, 111
Federal Regulations: 40 CFR Part 61

The following substances have been listed in the federal regulations cited above as hazardous air pollutants: asbestos, benzene, beryllium, coke oven emissions, inorganic arsenic, mercury, radionuclides, and vinyl chloride.

The following substances have been listed in various *Federal Registers* as posing potentially serious health effects from ambient air exposure: acrylonitrile, 1,3-butadiene, cadmium, carbon tetrachloride, chlorinated benzene, chlorofluorocarbon, chloroform, chloroprene, chromium, epichlorohydrin, ethylene dichloride, ethylene oxide, hexachlorocyclopentadiene, manganese, methyl chloroform, methylene chloride, perchloroethylene, polycyclic organic matter, toluene, trichloroethylene, vinylidene chloride.

Section 111 of the CAA, Standards of Performance for New Stationary Sources, provides broad authority to control pollutants emitted by new sources. For existing sources, state plans are to include the regulation of pollutants not listed in U.S.C.A. 7408 (a) or 7412 (b)(1)(A) but to which a standard of performance would apply if the source were a new source.

There is no comprehensive federal air toxics program. Although Section 112 of the CAA, National Emission Standards for Hazardous Air Pollutants (NESHAP), authorizes EPA to publish a list that "shall from time to time" be revised and to promulgate regulations for hazardous air pollutants, it is extremely difficult to place a particular pollutant in the NESHAPS regulations. There are presently only eight substances listed as hazardous air pollutants, while there are many others that should be. Congress is studying the possibility of amending the CAA to remedy this problem. Some states do have comprehensive air toxics programs, and the states in Region I all have some type of air toxics program. The scope of these programs varies a great deal, as does their effectiveness. Connecticut and Rhode Island, for example, both have air toxic regulations that cover a number of pollutants.

These standards are applied to sources during the permitting process. EPA has no enforcement authority with respect to the state programs that cover toxics not regulated pursuant to the CAA.

The programs delegated to the states pursuant to the CAA and the federal regulations are all directly enforceable by EPA. Separate delegations occur for each substance covered by the NESHAP regulations. Unlike the State Implementation Plans required for criteria air pollutants, states do not have to accept delegated authority for any substance listed in the federal NESHAPs, although they are encouraged to do so. For example, Vermont, Rhode Island, and Connecticut have not accepted the "demolition/renovation" delegation for asbestos. The other three states in Region I have accepted the delegation for a complete asbestos NESHAP, including the "demolition/renovation" aspect.

In some cases, the state NESHAP may be less stringent than the federal NESHAP. For example, Massachusetts, which has accepted full delegation, has an asbestos statute that only provides for a $25,000 penalty for a violation, as compared to the federal statute that allows for $25,000 per day for a continuing violation.

4. Radon: ranking = 1

There are no federal or state laws applicable to radon.

EPA has published guidelines that recommend levels at which homeowners should take action.

5. Indoor Air Pollutants Other than Radon: ranking = 1

Federal Statutory Law:	Toxic Substances Control Act (TSCA)
Federal Regulations:	TSCA regulations begin at 40 CFR Part700; 40 CFR Part 763 (asbestos)

The CAA does not explicitly address indoor air pollutants. EPA can indirectly address some of the pollutants listed in the work group's definition for this category, such as formaldehyde insulation and asbestos, under the Toxic Substances Control Act. There are no federal regulations concerning acceptable ambient levels of these pollutants. The use of some chemical substances, including the pesticide chlordane, can be restricted under TSCA by EPA's pesticides program. Congress is studying the issue of indoor air pollutants and the applicability of the CAA.

States can also regulate the use of pesticides such as chlordane and Massachusetts has a program for formaldehyde insulation, whereby a homeowner may qualify for state funds to remove the substance from a home. However, this is a voluntary program and cannot be required by the state. Massachusetts and Connecticut are currently studying the problem of indoor air pollutants at the legislative level.

6. Radiation from Sources Other than Radon: ranking = 1

There are no federal or state laws applicable to non-ionizing radiation from sources other than indoor radon.

7. Industrial Point Source Discharges to Surface Waters: ranking = 5

Federal Statutory Law:	Clean Water Act (CWA) 301, 303, 304, 306, 307, 318, 401, 402
Federal Regulations:	NPDES 40 CFR Parts 122, 123, 124, etc.

The National Point Source Discharges Effluent Standards (NPDES) program requires permits for the discharge of "pollutants" from any "point source" into "waters of the United States." State NPDES programs may be approved but are not required. In Region I, Vermont, Connecticut, and Rhode Island have state NPDES programs that have been approved by EPA and are run at the state level. The other three states have state permitting programs that regulate water pollution but that supplement, rather than take the place of, the federal NPDES program.

Sections 208 and 303 of the Clean Water Act (CWA) mandate that states adopt and periodically revise standards and develop management plans to control point source and nonpoint source pollution. Under Section 303, states are required to develop water quality standards sufficient to protect the public health or welfare, enhance the quality of waters, and serve the purposes of the Clean Water Act. Under this section, all the states in Region I have included antidegradation policies in their regulations and have requirements that waters be "free from" toxic pollutants in toxic amounts. Under Section 301(b)(1)(C), EPA must include limitations on NPDES permits sufficient to meet water quality standards, if such standards are more stringent than the technology-based limits mandated by Section 301. Also, states may require EPA to include more stringent conditions through their Section 401 certifications of NPDES permits.

Industrial discharges are subject to technology-based requirements that apply either industrywide or are set on a case-by-case basis. Compliance with these requirements is to be achieved in accordance with statutory or regulatory milestones; all industrial dischargers must comply with "best available treatment economically achievable" or "best conventional pollution control technology" no later than March 31, 1989. New permits are issued every five years and are frequently more stringent than prior ones due to new federal standards or more stringent state regulations.

For the most part, federal law and related regulatory schemes provide EPA with the tools it needs to address the problem. State laws and regulations also provide additional authority to deal with the problem.

8. POTW Discharges to Surface Waters: ranking = 5

Federal Statutory Law:	Clean Water Act (CWA) 307, 402, 405 (a)
Federal Regulations:	NPDES 40 CFR Parts 122, 123, 124 General Pretreatment Regulations for Existing and New Sources of Pollution, 40 CFR Part 403

As with problem area #7, Industrial Point Source Discharges, the National Point Source Discharges Effluent Standards (NPDES) program is applicable to POTW (Publicly Owned Treatment Works) discharges. The state laws referred to above are also applicable. In addition, Sections 208 and 303 of the Clean Water Act apply to POTWs.

As with the previous category, the federal regulatory program is generally sufficiently effective to deal with the problem defined. 40 CFR Part 403 establishes responsibilities of federal, state, and local governments and industry to implement National Pretreatment Standards to control pollutants that pass through or interfere with treatment processes in POTWs or that may contaminate sewage sludge.

In most cases, POTWs must develop, obtain EPA approval of, and implement pretreatment programs to control discharges. EPA has published categorical pretreatment standards that apply industrywide. There are a variety of pretreatment compliance deadlines for indirect discharges, and therefore it is difficult to generalize about them. In addition, POTWs establish local limits that apply to some or all discharges to the system.

9. Nonpoint Source Discharges to Surface Waters: ranking = 3

Federal Statutory Law:	Clean Water Act (CWA) 208, 303, 319 Nonpoint Source Management Programs
Federal Regulations:	Water Quality Planning and Management 40 CFR Part 130

Prior to the recent amendments to the Clean Water Act, this problem had not been adequately addressed under 208. Aside from the practical problems in dealing with nonpoint source pollution, 208 authorized no federal regulatory program, requiring only state programs.

The most recent amendments to the CWA contain Section 319, entitled "Nonpoint Source Management Programs." It remains to be seen whether this new authority provides a way to address the problem adequately. The conference committee's special report mentions that many states had nonpoint source pollution control programs prior to the passage of the recent amendments but that they were not very effective. The new law is intended to be much more comprehensive and effective. Section 319 of the CWA requires states to submit assessment reports and state management programs, to be implemented within the first four fiscal years after the date of submission. A report by each state is to be submitted for EPA approval by August 1988, identifying all state waters that are not expected to meet water quality standards because of nonpoint source pollution and presenting a management program for controlling the pollution. The purpose of the programs is to control pollution added from nonpoint sources to the navigable waters within the state and also to improve the quality of such waters. At this time, all six states in Region I have submitted the required assessments, which are in the process of being evaluated by EPA. If a state plan is approved, EPA will provide financial assistance to that state.

40 CFR Part 130 establishes policies and program requirements for water quality planning, management, and implementation under various sections of the Clean Water Act.

10. Discharges to Estuaries, Coastal Waters, and Oceans from All Sources: ranking = 4

Federal Statutory Law:	Clean Water Act (CWA) 208, 301, 303, 304, 306, 307, 317, 320, 318, 401, 402, 403 Rivers and Harbors Act of 1899 Marine Protection, Research, and Sanctuaries Act of 1972 Coastal Zone Management Act

Section 403 of the Clean Water Act requires the Administrator to promulgate guidelines for determining the degradation of the waters of the territorial seas, the contiguous zone, and the oceans. Any permits issued under 402 must be in compliance with these guidelines.

Sections 317 and 320 of the Clean Water Act establish the National Estuary Program. Its purposes are to identify nationally significant estuaries that are threatened by pollution, development, or overuse; promote comprehensive planning for, and conservation management of, nationally significant estuaries; encourage the preparation of management plans for estuaries of national significance; and enhance the coordination of estuary research.

Although it is not a fault of the statute, EPA has not focused on municipal (POTWs) discharges to coastal areas because it has concentrated on industrial discharges. In general, varying compliance deadlines apply depending on the source, and nonpoint sources do not need permits at all. The comments made concerning point and nonpoint discharges in problem areas #7 and #9 apply to this category as well.

The Marine Restoration and Protection Act (MRPA) of 1972 aims to identify areas of the marine environment of special national significance due to their resource or human use values; to provide authority for comprehensive and coordinated conservation and management of these marine areas that will complement existing regulatory authorities; to support, promote, and coordinate scientific research and monitoring of the resources of these marine areas; to enhance public awareness, understanding, appreciation, and wise use of the marine environment; and to facilitate, to the extent compatible with the primary objective of resource protection, all public and private uses of the resources of these marine areas not prohibited pursuant to other authorities. The Secretary of Commerce is given primary authority to administer the MRPA. Under the MRPA, EPA is required to protect oceans from indiscriminate dumping of wastes. The Agency is authorized to designate safe sites for dumping and to assess penalties for improper dumping.

Under the Coastal Zone Management Act (CZMA), which is applicable to the peripheral states, the federal government is to encourage and assist states in developing and carrying out management programs to preserve, protect, develop, and whenever possible restore the resources of the coastal zone of the United States. State plans must be approved by the National Oceanic and Atmospheric Administration but are not required. Federal funds are offered for the preparation and implementation of state plans that meet federal approval. Although the plans are administered by the states, they must include consideration of designated federal policy interests. EPA is not given administrative authority under the CZMA.

11. Wetlands/Habitat Loss: ranking = 2

Federal Statutory Law:	Clean Water Act (CWA) 404
Executive Order No. 11990:	Protection of Wetlands
Federal Regulations:	40 CFR Part 230

Section 404 of the CWA requires both EPA and the U.S. Army Corps of Engineers to protect waters against degradation and destruction caused by discharge of dredged or fill material. This section's provisions extends to the nation's wetlands. Under Section 404 EPA has the following authority:

1. Under a memorandum of understanding with the Corps mandated by 404(q), EPA must be consulted, and its comments considered, in the Corps' permit decisions.
2. Section 404(b)(1) requires EPA, in conjunction with the Corps, to issue guidelines that are to be applied by the Corps in deciding whether to issue a permit.

3. Section 404(c) authorizes EPA to veto the Corps' issuance of a permit.

4. Under an opinion of the U.S. Attorney General, EPA (rather than the Corps) has the final authority to make the wetlands determination.

There are two problems with the CWA as it relates to wetlands. First, it only regulates the *discharge* of fill and dredged material, while many other types of destruction are part of this problem area. Second, the statute has divided the authority to address the problem between the U.S. Army Corps of Engineers and EPA.

Executive Order No. 11990, signed May 24, 1977, requires federal agencies to take action to avoid adversely impacting wetlands wherever possible, to minimize wetlands destruction and to preserve the values of wetlands, and to prescribe procedures to implement the policies and procedures of this Executive Order. EPA policy and guidance for carrying out the provisions of Executive Order 11990 are set forth in the Agency's Statement of Procedures in 40 CFR Part 6, Appendix A. The Executive Order applies to activities of federal agencies pertaining to (1) acquiring, managing, and disposing of federal lands and facilities, (2) providing federally undertaken, financed, or assisted construction and improvements, and (3) conducting federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulating, and licensing activities.

State laws governing wetlands protection in New England tend to be better established than elsewhere in the country. However, state laws are a patchwork of varying definitions, threshold requirements, and effectiveness. Several state laws are administered by local conservation commissions in each city or town. States also have important authority in the 404 program by virtue of their power under Section 401 of the Clean Water Act to issue, waive, or deny water quality certification for federal permits and licenses; the states are allowed to address interstate effects under 401(a) of the Act. Where appropriate, states have similar authority to make "consistency determinations" under the Coastal Zone Management Act (CZMA). Many states have within the last few years used their 401 certification and the CZM consistency reviews to deny or modify general permits proposed by the Army Corps of Engineers, although the Corps is now moving to limit the state's authority in this regard.

The 401 certification process exerts considerable influence on permit decisions and can be a valuable tool to protect wetlands, but 401 certification procedures vary greatly from state to state within Region I and in general appear to be underused as a mechanism to protect natural resources, especially wetlands.

Under the Fish and Wildlife Coordination Act, the Army Corps of Engineers must solicit states' views about proposed projects requiring 404 permits. EPA may also comment directly to the states about proposed permits that will require authorization under Section 404.

States with programs that comply with EPA's state program regulations may administer the 404 program; EPA approves the assumption of 404 permitting authority upon application by qualified states. The Clean Water Act allows the assumption of permitting authority to occur only for waters that are not tidal or traditionally navigable. This fact, coupled with the lack of direct financial support for assumed programs, has left most states uninterested in pursuing the permitting assumption of the federal program. Michigan is the only state in the country that has assumed 404 permitting authority.

12. Drinking Water: ranking = 3

Federal Statutory Law: Safe Drinking Water Act (SDWA) and 1986 Amendments
Toxic Substances Control Act (TSCA)
Federal Regulations: 40 CFR Part 141
40 CFR Part 761

Subject to variances and exemptions listed elsewhere in the SWDA, Section 1411 authorizes the establishment of national primary drinking water regulations that are intended to be applicable to each public water system in each state. However, such regulations shall not apply to a public water system that:

1. Consists only of distribution and storage facilities (and does not have any collection and treatment facilities)

2. Obtains all of its water from, but is not owned or operated by, a public water system to which such regulations apply

3. Does not sell water to any person

4. Is not a carrier conveying passengers in interstate commerce

The definition of the term "public" in the SDWA is sufficiently broad to include almost any source of drinking water that serves 25 people or 15 connections. 40 CFR part 141 contains the National Primary Drinking Water regulations. 40 CFR Part 142 contains the National Interim Primary Drinking Water Regulations Implementation.

The SDWA also contains sections that protect aquifers and wellhead protection areas, including a section entitled "Sole Source Aquifer Demonstration Program." The "sole source" program protects critical aquifer protection areas located within areas designated as sole or principal source aquifers under the Act. Under the section entitled "State Programs to Establish Wellhead Protection Areas," states are to adopt a program to protect wellhead areas within their jurisdiction from contaminants that may have any adverse effect on the health of persons. A wellhead protection area is the surface and subsurface area surrounding a water well or wellfield, supplying a public water system, through which contaminants are reasonably likely to move toward and reach.

The SDWA was amended in June of 1986. It is therefore difficult at this time to assess the adequacy of the law. However, prior to the amendments, there was a significant enforcement problem with the SDWA. The federal government had no direct enforcement authority because the states had primacy. A long process, which included a finding by EPA that states had abused their authority, was required before EPA could take any enforcement action. The 1986 amendments solved this problem to some extent, by shortening the time after which EPA could act following insufficient state enforcement and requiring only that EPA find the state's enforcement action "inadequate." The states still have primacy, however, provided their requirements are "as stringent" as the federal ones. All states in Region I have primacy.

The 1986 amendments to the Act recognize 83 contaminants for which regulations must be developed. The Administrator must publish Maximum Contaminant Level Goals and promulgate National Primary Drinking Water Regulations for not less than nine of the listed contaminants within one year of the enactment of the amendments. Another 40 of the listed contaminants must be regulated within two years of the date of enactment. The remainder of the contaminants are to be regulated within three years of enactment of the amendments. At the time of the 1986 amendments, 21 contaminants were covered by the Interim Primary Drinking Water Regulations. The amendments upgraded these regulations to National Primary Drinking Water Regulations. These 21 contaminants are included in the 83 identified by the amendments.

Section 319 of the CWA provides for federal grants to states for the development of nonpoint source pollution programs. These funds may also be used to protect ground water (see problem area #19).

TSCA (Toxic Substances Control Act) prohibits the spillage of PCBs onto the ground and could be invoked if ground water used for drinking purposes were to become contaminated.

13. RCRA Waste Sites: ranking = 4

Federal Statutory Law:	Resource Conservation and Recovery Act (RCRA)
Federal Regulations:	40 CFR Part 262, 263, 264, 265, etc.

Subtitle C of RCRA covers hazardous waste (HW) management. EPA is required to develop and promulgate criteria for identifying the characteristics of HW and for listing HW. Such criteria may be revised from time to time. Following these criteria, the Administrator is to promulgate regulations identifying and listing HW. Subtitle C authorizes the promulgation of regulations for standards applicable to generators and transporters of HW and to owners and operators of HW treatment, storage, and disposal facilities.

In general, RCRA's regulatory aspect consists of a detailed preventive program of standards for storage, treatment, and disposal of hazardous waste. This program covers everything except solid waste management. The cleanup aspect of RCRA requires responsible parties to document releases and authorizes the federal government to undertake studies and to take corrective action. This aspect of RCRA includes solid waste management.

40 CFR Parts 262, 263, 264, and 265 contain the above mentioned regulations relating to the generation, transportation, treatment, storage, and disposal of HW.

In Region I, all states except Maine and Connecticut currently have federally approved hazardous waste management programs pursuant to Subtitle C. Maine's program is in the final stages of authorization. Connecticut has its own state hazardous waste management program. No states have the authority to take corrective action.

There may be some double-counting with Superfund waste sites because some RCRA landfills have become Superfund sites. Also, if a Superfund waste site is closed it must be done in such a way as to conform to RCRA requirements.

RCRA generally addresses the elements of this problem area. The difficulty in implementing the statute involves the unresolved question of what, exactly, is the remedial goal. EPA has the authority to study and clean up but is always struggling with the precise standards that should be met.

14. Superfund Waste Sites: ranking = 3

Federal Statutory Law:	Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)
Federal regulations:	40 CFR beginning at Part 300

CERCLA requires EPA to promulgate and revise regulations designating hazardous substances, including such elements, compounds, mixtures, solutions, and substances that when released into the environment may present substantial danger to the public health, welfare, or the environment. EPA also must promulgate and revise regulations for the hazardous substances listed in 101 (14):

a. Any substance in Section 311 (b)(2)(A) of the FWPCA

b. Any substance in Section 102 of CERCLA

c. Any HW having the characteristics identified under or listed pursuant to 3001 of the Solid Waste Disposal Act

d. Any toxic pollutant listed under Section 307 (a) of the FWPCA

e. Any hazardous air pollutant listed under Section 112 of the Clean Air Act

f. Any imminently hazardous chemical substance or mixture with respect to which EPA has taken action pursuant to TSCA.

Recent amendments to CERCLA are the Superfund Amendments and Reauthorization Act (SARA). The federal CERCLA regulations will be revised pursuant to SARA. The National Oil and Hazardous Substances Pollution Contingency Plan, established by the regulations, will put into effect the response powers and responsibilities created by CERCLA and the authorities established by Section 311 of the Clean Water Act.

The SARA amendments substantially change EPA's settlement policy and make cleanup requirements more stringent. CERCLA requires EPA to begin 170 remedial actions and a certain number of remedial investigations and feasibility studies by mid-1989. Thus it is difficult to evaluate the statute or regulations at this time.

With respect to the sufficiency of the statutory law prior to SARA, not many sites have actually been cleaned up but the Act generally addresses the problem and EPA has won most of the litigated issues. Although Superfund generally addresses the problem for which it was designed, the larger problem of limiting the generation of waste has not been addressed.

15. Municipal Waste Sites: ranking = 2

Federal Statutory Law: Resource Conservation and Recovery Act (RCRA)
Municipal law

Subtitle D of RCRA addresses municipal waste sites. It provides for state-implemented programs. EPA sets the standards for sanitary landfills but has limited authority to enforce these standards. EPA's regulations, promulgated pursuant to Subtitle D, are currently being revised. Under EPA's unrevised regulations, Massachusetts and Connecticut are the only states in Region I with approved state programs.

Under RCRA Section 7003, EPA has authority to take action when an imminent hazard exists. In reality this authority is severely limited, given the number of sites involved. Most municipal waste sites are thought to be problem areas.

Although Subtitle D addresses the issue of regulating these waste sites, it does not address the problem of the amount of waste being generated and the fact that we are running out of usable space to accommodate it. Therefore, it could be said that the legislation is not really adequate to deal with the problem. Furthermore, no federal program is authorized in the event states do not obtain federal approval of their state programs.

16. Industrial Waste Sites: ranking = 2

Federal Statutory Law: Resource Conservation and Recovery Act (RCRA)

The objectives of Subtitle D of RCRA are to assist in developing and encouraging methods for solid waste disposal that are environmentally sound, that maximize the utilization of valuable resources (including energy and materials, which are recoverable from solid waste), and that encourage resource conservation. RCRA provides for federal approval of state programs and the comments made under problem area #15 concerning Subtitle D also apply here.

17. Accidental Releases: ranking = 5

Federal Statutory Law: Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)
Resource Conservation and Recovery Act (RCRA)
Clean Water Act (CWA) 311(c)
Toxic Substances Control Act (TSCA)
Clean Air Act (NESHAP)

Section 112 of the Clean Air Act, the National Emission Standards for Hazardous Air Pollutants, addresses accidental releases (see problem area #3).

Both the CWA and CERCLA require notification to the government of discharges of "reportable quantities," which is dependent upon the substance involved. If the discharge is to water, Section 311 of the CWA applies; if the discharge is to land, Section 103 of CERCLA applies.

In terms of cleanup, CERCLA provides for Superfund response action, both for short-term emergency removal action and long-term remedial action. The Clean Water Act also provides for emergency removal action. There is enforcement authority under both Sections 106 of CERCLA and Section 7003 of RCRA to deal with parties responsible for the discharges. The standard under these sections is whether an imminent hazard exists. RCRA and CERCLA both provide for cost recovery in these circumstances. It is possible to argue that, depending on the substances involved, such releases are unpermitted disposals of hazardous waste. This would enable the RCRA regulatory program to be applied to the problem.

TSCA provides authority to prevent the improper disposal of PCBs. Any spilling onto the ground of PCBs is prohibited. The only acceptable disposal methods are licensed incinerators and landfills. The Administrator is required by the statute to regulate PCBs. The federal regulatory program is generally effective in dealing with problems posed by PCBs. State laws and regulations addressing PCBs are not more stringent than the federal law and regulations.

18. Releases from Storage Tanks: ranking = 3

Federal Statutory Law: Resource Conservation and Recovery Act (RCRA)
Superfund Amendments and Reauthorization Act (SARA)
Clean Water Act (CWA)
Federal regulations: 40 CFR Part 280--Interim Prohibition
40 CFR Part 112

Subtitle I of RCRA authorizes the federal government, and state governments under federally approved programs, to regulate underground storage tanks (USTs) and to take corrective action in response to releases from such tanks. These tanks may contain petroleum or other "regulated substances." The federal regulations in 40 CFR Part 280 address underground storage tanks for purposes of the Interim Prohibition. Under the Interim Prohibition, owners and operators are prohibited from installing or maintaining insufficiently protected tanks. The final EPA regulations covering underground storage tanks are expected to be published in late spring.

EPA is attempting to delegate programs to the states in Region I. Connecticut, Vermont, New Hampshire, and Maine are farthest along in terms of obtaining the state statutory authorities necessary for state program approval. Bills that aim to provide necessary authorities for a federally approved program are currently before the legislatures in all six of the Region's states. EPA began the process of state program approval in the spring of 1988 and is hopeful that all six states will eventually have delegated programs.

In Region I, all states have some authority to regulate USTs independently of Subtitle I. Regulatory programs vary from state to state.

The Superfund Amendments and Reauthorization Act of 1986 (SARA) contains an amendment to Subtitle I of RCRA that establishes the Leaking Underground Storage Tank Trust Fund (LUST Trust Fund). This fund applies only to petroleum releases from USTs. EPA, and the states that have cooperative agreements with EPA, will be able to utilize the Fund for a number of activities, the most important of which are to:

- Order owners and operators of USTs to clean up leaks
- Conduct cleanups that are necessary to protect human health and the environment
- Recover the costs of these enforcement actions or cleanups

The allocation of money from the LUST Trust Fund to the states in Region I has begun.

With respect to above-ground storage tanks, the CWA and EPA's regulations promulgated in 40 CFR Part 112 establish the Spill Prevention Control and Countermeasure Plan. The program requires owners of tanks containing oil with capacity greater than 660 gallons to develop and maintain plans for the prevention of spills and for responses to releases. However, these regulations are only applicable to releases to the "navigable waters of the United States or adjoining shorelines," and hence would seem not to be applicable to releases to ground water. Furthermore, these regulations only cover oil pollution and do not cover other substances of concern to the Risk Management Work Group. Some Senators have filed legislation addressing the issue of above-ground tanks as an attempt to obtain clearer and more stringent rules and regulations. In Region I, state laws addressing above-ground storage tanks are almost nonexistent, and existing laws are considered inadequate by EPA.

This problem area involves two separate categories, underground storage tanks and above-ground storage tanks. Had the issue of above-ground storage tank pollution been set off as a category on its own, the problem area would have received a ranking of "2." However, the problem area, as defined by the work group, seemed to warrant an overall ranking of "3."

19. Other Ground-Water Contamination: ranking = 3

Federal Statutory Law:	Safe Drinking Water Act (SDWA) Clean Water Act (CWA) 319 Toxic Substances Control Act (TSCA)
Federal Regulations:	40 CFR 144, 145, 146, 147, 149 40 CFR Part 761; 40 CFR Part 130

Through the Safe Drinking Water Act, the federal government has delegated underground injection control programs to all six states in our region (see problem area #12). For this category, Region I's major concern is Class V injection wells. Class V injection wells include drainage wells, geothermal reinjection wells, domestic wastewater disposal wells, mineral and fossil fuel recovery wells, industrial/commercial/utility disposal wells, and recharge wells, in addition to other miscellaneous wells.

Road salt, irrigation practices, fertilizer leaching, and similar sources are considered nonpoint sources for determining legal authority. Prior to the recent amendments to the CWA, the federal statutes have not adequately dealt with the problem of nonpoint source pollution (see comments in problem area #9). Septic systems--another potential source--are included in Class V injection wells.

Section 319 of the CWA, aided by the recent amendments, provides for federal grants to states for nonpoint source management programs. Included in this grant program are funds that can be used for ground-water quality protection. The conference committee's special report states that the new law provides for "a much more comprehensive effort."

TSCA addresses any spill of PCBs onto the ground. If PCBs actually contaminate ground water, the statute provides for penalties and for a grant of jurisdiction for equitable relief. The federal regulatory program concerning PCBs is generally effective for this problem area. State laws and programs concerning the regulation of PCBs are not more stringent than the federal law and regulations.

20. Pesticide Residues on Food: ranking = 4

Federal Statutory Law: Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)

Federal and state authorities are, on their face, adequate to address this problem area. FIFRA sets pesticide tolerances. The federal Food, Drug and Cosmetic Act monitors pesticides in foods through marketplace sampling, authorizes regulatory action where permitted residue levels are exceeded, and prohibits use of materials that are animal carcinogens.

States may, but are not required to, set pesticide tolerances. If they do, these must be more stringent than those set by FIFRA. Some states also monitor pesticides on foods. All states have authority to remove foodstuffs where health is threatened; most have authority to implement regulatory constraints where permitted residue levels are exceeded.

The federal Food and Drug Administration has enforcement authority for this problem area.

21. Pesticide Application: ranking = 4

Federal Statutory Law: Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)

FIFRA establishes application parameters/restrictions through label registration and approval. Almost all enforcement-of-use provisions of FIFRA are delegated to states through EPA grants. Certification and training of applicators is totally within state purview (see problem area #20).

22. Lead: ranking = 3

Federal Statutory Law:	Clean Air Act (CAA) Clean Water Act (CWA) Safe Drinking Water Act (SDWA) Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Resource Conservation and Recovery Act (RCRA)
Federal Regulations:	40 CFR Parts 50, 51, etc. 40 CFR Parts 141, 142, etc. 40 CFR Part 261

Lead is a criteria air pollutant regulated under the National Ambient Air Quality Standards (NAAQS) pursuant to the CAA (see problem area #1). Under the Act, State Implementation Plans are designed to demonstrate attainment and maintenance of the NAAQS for lead. There are currently no states in New England that are nonattainment areas with respect to lead. Even when states are not in violation of NAAQS, they must establish and submit to EPA new source review procedures to assure maintenance of acceptable levels.

The Safe Drinking Water Act deals independently with the problem of lead contamination. The 1986 amendments to the Act include a prohibition against the use of lead pipes for water systems. The amendments forbid the use of pipe, solder, or flux that is not lead-free in the installation or repair of any public water system or in any plumbing system providing water for human consumption. Public notice is required where there is lead content in the construction materials of the public water supply and/or where the water is sufficiently corrosive to cause leaching of lead. Prior to the amendments, some states had such a prohibition, but the 1986 amendments mark the first instance that this standard has appeared in the federal law.

The new SDWA regulations, promulgated on October 28, 1987, establish public notice requirements pertaining to lead. By June 19, 1988, the owner or operator of each community water system and each nontransient, noncommunity water system that is not "lead free" shall issue notice to persons served by the system who may be affected by lead contamination of their drinking water. This must be done even though current standards are not being violated. The state may require subsequent notices. EPA has set drinking-water standards and has determined that lead is a health concern at certain levels of exposure. Currently the standard is 0.050 parts per million (ppm). Based on new health information, EPA is likely to lower this standard significantly. The new federal regulations require all states to enforce the requirements pertaining to public notices for lead. If the Administrator determines that a state is not enforcing these requirements, the Administrator may withhold up to 5 percent of the state's program grant fund.

The statutory definition of hazardous waste is very broad in RCRA and includes lead. RCRA is not effective in dealing with the problem of lead contamination to soil, largely because there is no authority under Section 7003 for EPA to expend EPA resources tc remediate a particular site. EPA must issue an order to the landowner or other responsible party. If the order is not adhered to, EPA must litigate or obtain an injunction.

With respect to the normal regulatory framework in RCRA, there are two problems concerning the control of lead pollution: First, under the RCRA regulations, for lead to be addressed, it must be a hazardous waste under the EP toxicity test. Lead in soil does not ordinarily fall into the hazardous waste category under the test, i.e., it is not EP toxic. This is the case even though lead is a hazardous waste under the statute. Even if it were considered a hazardous waste under the RCRA regulations, lead would in many cases be exempted as a household waste. EPA is presently working on changing the EP toxicity test. Second, the test itself only considers toxic those substances that leach out when in soil. If the substance is "stable" it is not considered a risk. This definition was intended to protect ground water; however, it ignores the obvious problem of direct contact with the substance in the soil. Lead does not dissipate in soil sufficiently to render it harmless.

Lead is a hazardous substance under the Clean Water Act. The definition of hazardous waste in Section 101 of CERCLA refers to the Clean Water Act's definition of hazardous waste and therefore includes lead. The Superfund Amendments (SARA) authorize the Administrator to develop a demonstration project ($15 million) to investigate the effect of removal of lead-contaminated soil.

CERCLA more fully covers the problem of lead pollution than does RCRA. EPA has the authority to perform removal activities. Residential yards are legally and technically within the reach of allowable removal activities. However, as a matter of policy, EPA has decided not to perform any removal activities on residential properties.

The SARA amendments also required an overview study of lead pollution. Affected populations, sources of lead contamination, and the resulting effects were all part of this study. The report was released in July 1988.

Whereas EPA has less authority to deal with interior lead pollution (except with water), the states have more authority for interior than exterior pollution sites. The split of authority over interior/exterior problems leads to complications at the remedy stage.

23. *Asbestos: ranking = 5*

Federal Statutory Law:	Clean Air Act (CAA) 112 Toxic Substances Control Act (TSCA) Asbestos Hazard Emergency Response Act Safe Drinking Water Act (SDWA)
Federal Regulations:	40 CFR Part 61 (NESHAP); 40 CFR Part 763; 40 CFR Part 141, 142

Asbestos is one of the designated hazardous air pollutants under the National Emission Standards for Hazardous Air Pollutants (NESHAP), pursuant to Section 112 of the Clean Air Act. The NESHAP regulations require the removal of friable asbestos-contaminated material (ACM) prior to demolition or renovation projects that may disturb the ACM. The intent of the NESHAP is to prevent contamination of the ambient air. Three states in the region have accepted delegation of the full asbestos NESHAP. Vermont, Connecticut, and Rhode Island have declined the demolition/renovation aspect of the asbestos NESHAP. One of the problems with the Clean Air Act is its lack of a provision authorizing administrative assessment of penalties in addition to court assessment of penalties.

Asbestos is covered under TSCA for inspecting structures. Depending on the amount and condition of the asbestos found, the Act provides for repair or removal of the substance. Regulations governing the identification and management of ACM in school buildings and the protection of public employees who perform asbestos abatement work are found under TSCA. Also under TSCA, the Agency has established accreditation requirements for asbestos abatement professionals. Many states have statutes and regulations concerning asbestos removal.

Under the Asbestos Hazard Emergency Response Act, EPA is directed to promulgate regulations that provide a framework for addressing asbestos problems in public and private elementary and secondary schools. The rule requires schools to inspect buildings, develop management plans, and implement response actions. EPA's final rule was issued on October 17, 1987, in accordance with the statutory deadline.

The Asbestos School Hazard Abatement Act (ASHAA) was enacted in 1984. Under ASHAA, the Agency has funded university-based centers to provide training, provided funds for states to develop asbestos programs, and helped schools finance abatement projects.

Many state and local authorities enforce regulatory requirements addressing the identification and management of ACM in buildings, the removal and disposal of ACM, and the training and accreditation of those performing asbestos abatement projects.

The Safe Drinking Water Act amendments of 1986 address the problem of asbestos in drinking water.

24. Lakes, Ponds, and Impoundments: ranking = 3

Federal Statutory Law:	Clean Water Act (CWA) 314 Resource Conservation and Recovery Act (RCRA) Executive Order No. 11990, Protection of Wetlands
Federal Regulations:	See categories #7 and #9, above

In general, the Clean Water Act treats the bodies of water in this category in the same way as other waters. Under the recent amendments to the Clean Water Act, each state is required to prepare and submit to the Administrator for approval:

1. An identification and classification, according to eutrophic condition, of all publicly owned lakes in the state

2. A description of procedures, processes, and methods (including land use requirements, to control sources of pollution of such lakes

3. A description of methods and procedures, in conjunction with appropriate federal agencies, to restore the quality of such lakes

The Administrator is authorized and directed to establish and conduct a lake water quality demonstration program. The Administrator is also required to publish and disseminate a lake restoration guidance manual to guide state and local officials.

Under Section 3005 of RCRA, Permits for Treatment, Storage, or Disposal of Hazardous Waste, each surface impoundment in existence on the date of enactment of the Hazardous and Solid Waste Amendments of 1984 and qualifying for operation shall not receive, store, or treat hazardous waste after a date four years following the date of enactment, unless such surface impoundment is in compliance with certain requirements that would apply to such impoundment if it were new. Under Section 3005, the Administrator is required to promulgate regulations requiring each person owning or operating an existing facility or planning to construct a new facility for the treatment, storage, or disposal of hazardous waste to have a permit issued pursuant to this section.

RCRA is only applicable to surface impoundments that contain hazardous waste.

Executive Order No. 11990 states that "wetlands" generally includes natural ponds.

Because nonpoint source pollution is the primary problem for this category and is addressed by the recent amendments to the Clean Water Act, this problem area received a ranking of "3."

VI. Effective Technology Factor

Definition of Factor/Background

The effective technology factor identifies and evaluates the existence of pollution-control methods that reduce the risk in each of the listed problem areas. The methods may include pollution-control equipment and technologies and/or imposition of operation and maintenance (O & M) or management practices. This factor addresses only the extent to which such methods exist; costs of their imposition are covered by the economic impacts factor (Chapter IV).

Sources of Information

The major, and in some cases only, source of information was the regional program office for the particular problem area. A copy of the standard questionnaire sent to them is attached. Other sources, where needed, included any of the following:

- Regulations and associated development documents
- Program-specific guidance documents
- Training course materials, textbooks, etc.
- Other EPA publications
- EPA hotlines
- Industry/trade/scientific periodicals

Ranking Criteria and Adjustment Factors

The effective technology ranking considers the reliability and efficiency of existing methods as well as their applicability in reducing problems that remain despite current measures imposed in each problem area. The ranking process begins by identifying possible technologies and fitting them into categories 1 through 4, as defined below. Category 4 includes the most reliable technologies; technologies given the lower numbers become increasingly less certain. These initial rankings are then modified using the adjustment factors defined below, which account for the individual technology's efficiency, the amount of the problem to which the technology can be applied, and the size of the presently existing problem as it relates to the technology's reduction potential.

Initial Technology Rankings

1. Experimental technology: pilot-stage technology, unproven for widespread application, or no apparent technology

2. New technology: coming out of the pilot phase but not yet in widespread full-scale use

3. Proven technology: more time and experimentation required than in category 4 to fit the technology to individual applications:

    - O & M/management practices that involve major process changes

    - Borrowed technology, i.e., adaptable from one industry to another

4. Off-the-shelf technology: little implementation delay for testing or modification:

    - O & M/management practices that are easy to implement

Adjustment Factors

- Base assumption for the ranking is that the technology is 75 percent efficient[1] and applies to most sources of the problem area.

- If the technology exceeds 75 percent efficiency but applies only to a minority of sources, reduce the rank by one level.

- If the technology is less than 75 percent efficient and applies to or is effective for a majority of the problem area's sources, reduce the ranking by one level.

- A technology less than 75 percent efficient that applies to or is effective for a minority of a problem area's sources would reduce ranking by two levels.

- If a technology is less than 50 percent efficient but applies to or is effective for a majority of the problem area's sources, reduce the ranking by two levels.

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[1] "Efficiency" denotes only the technology's innate efficiency, not its perceived effectiveness on the problem area. The effectiveness accounts for both the technology's efficiency and its applicability to the problem area, the latter of which is separately considered in the adjustment factors.

- A technology less than 50 percent efficient, which applies to or is effective for a minority of a problem's sources, would reduce final ranking by three levels.
- If the size of the remaining problem is large enough so that technology has great reduction potential, raise the ranking by one level unlessthe initial ranking is 1 (no apparent technology).[2]

The following example is provided for illustration.

Applicability

Technology or practice efficiency	Applies to all or nearly all sources of problem	Applies to a majority of problem's sources	Applies only to a small number of problem's sources
< 99%	NC	NC	NC
> 75%	NC	NC	D1
< 75%	D1	D1	D2
< 50%	D2	D2	D3

R _____ = raise _____ number of levels
D _____ = drop _____ number of levels
NC = no change

Technology estimated as off-the-shelf.

	4	:Technology = off-the-shelf
	+ 1	:Big problem remains
	- 1	:< 75% efficient, applies to most of problem
Ranking =	4	

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[2] The size of the problem that remains after the current level of reduction/control activity leads to an upward ranking adjustment if the size is large enough, because even a relatively inefficient technology might get a worthwhile reduction when applied to a large problem. Of course, that could not be true if there were no technology available (initial ranking of 1).

Conclusions and Recommendations

A tabular summary of the effective technology rankings is attached. The ranking process shows that while technologies available for the 24 problem areas do vary in reliability, there are *no* problem areas without *any* effective control technologies. Furthermore, most of the problem areas ranked fairly high (4 or 5 on a scale of 1 to 5), with no problem area rankings below mid-range (3). Thus, the reliability of available technologies for most problem areas is relatively well-proven, not experimental.

With more time and more detailed information for this ranking process, slightly different or more accurate numbers might result, especially in problem areas with complicated mixtures of pollutants, media, or technologies. However, given the necessary assumptions about types of sources and changes over time, it is likely that any improvement in estimates would be small and that the *relative* ranking would change very little. Therefore, we would not recommend spending significant effort to make the ranking process for this factor more detailed.

Summary of Effective Technology Ratings

		Rating
1.	Criteria Air Pollutants	4
2.	Acid Deposition and Visibility	5
3.	Hazardous/Toxic Air Pollutants	5
4.	Radon	4
5.	Indoor Air Pollutants Other than Radon	4
6.	Radiation from Sources Other than Radon	4
7.	Industrial Point Sources Discharges to Surface Waters	5
8.	POTW Discharges to Surface Waters	5
9.	Nonpoint Source Discharges to Surface Waters	4
10.	Discharges to Estuaries, Coastal Waters, and Oceans from All Sources	5
11.	Wetlands/Habitat Loss	3
12.	Drinking Water	4
13.	RCRA Waste Sites	4
14.	Superfund Waste Sites	3
15.	Municipal Waste Sites	4
16.	Industrial Waste Sites	4
17.	Accidental Releases	3
18.	Releases from Storage Tanks	4
19.	Other Ground-Water Contamination	3
20.	Pesticide Residues on Foods	4
21.	Pesticide Application	4
22.	Lead	4
23.	Asbestos	5
24.	Lakes, Ponds, and Impoundments	5

Problem Area Assessments and Rankings

1. Criteria Air Pollutants: ranking = 4

Criteria pollutant emissions are controlled by a wide range of technologies, from new technology to off-the-shelf technology, most of which are greater than 75 percent efficient. Off-the-shelf technologies include catalytic converters for mobile sources of NOx, VOC (precursor for ozone), and CO; scrubbers and fuel switching for stationary SO_2 sources; baghouses and cyclones for stationary particulate sources and incinerators for stationary VOC sources; and minimization of lead in gasoline. Proven technologies include solvent recovery units or reformulation for VOC sources, burner redesign and operation for NOx and CO control, and electrostatic precipitators for control of stationary particulate sources. Some new technologies, such as mobile diesel particulate traps and internal diesel engine modifications for NOx control, also exist. The existing criteria pollutant problem from mobile sources is fairly small, because most of the older, less-controlled vehicles are no longer in use. However, some of the criteria pollutants, such as ozone and SO_2, still have large enough stationary source problems to allow for great reduction potential with more technology. The overall category ranking comes from a combination of the available technologies' rankings. The rankings were weighted on the basis of their associated pollutant's relative contribution to the criteria air pollutant problem. This contribution was projected from the pollutant's relative mass of emissions, not from any assumed relative risk.

	NO_x		SO_2		CO		PT		O_3/VOC		
Category	Mobile/	Stationary	Mobile/	Stationary	Mobile/	Stationary	Mobile/	Stationary	Mobile/	Stationary	Description
Technology	4		NA	4	4			4	4		Off Shelf
		3	NA			3				3	Proven
			NA				2				New Technology
			NA								Experimental
			NA								None
Efficiency			NA								>99%
		X	NA	X	X	X	X	X	X	X	>75%
	X		NA								50%-75%
			NA								<50%
Applicability	-1	NC	NA		NC	NC			NC		Nearly all
			NA	NC			NC	NC		NC	Majority
			NA								Small
Existing Problem			NA	+1						+1	Large
			NA					NC			Moderate
	NC	NC	NA		NC	NC	NC		NC		Small
Ranking	3	3	NA	5	4	3	2	4	4	4	XXXXXXXXXX
Weighted Average = 3.86 = 4; Lead in air = 4 (See problem area #22.)											

2. *Acid Deposition and Visibility: ranking = 5*

The control of the sulfur compound emissions that result in acid deposition and impaired visibility can be accomplished by scrubbing, fuel switching, or coal cleaning. All of these technologies are proven and require little individual adaptation. Their application, requiring only the will to bear the costs, is greater than 75 percent efficient and suitable for most of the problem area. The large existing problem could be reduced effectively by these technologies.

off-the-shelf (4) + >75% effic./majority (NC) + large (+1) = 5

3. *Hazardous/Toxic Air Pollutants: ranking = 5*

This category covers a wide array of pollutants. Although applicable technologies depend upon both the pollutant and its source, most are off-the-shelf or at least proven technologies. They include baghouses, cyclones, electrostatic precipitators, burner controls and design, management/O & M practices, public education programs, incineration, flaring, solvent recovery, reformulation, gasoline refueling controls, and others. Most of these are greater than 75 percent efficient in controlling hazardous and toxic air pollutants. However, problems arise both in identifying specific areas of concern and in bearing the costs of needed controls, so the existing addressable problem is large.

off-the-shelf or proven (3 or 4) + >75% effic./majority (NC) + large (+1) = 4 or 5

4. *Radon: ranking = 4*

Methods for reducing indoor radon levels have been developed and proven by EPA's Office of Research and Development, but they all require some time and experimentation to apply to individual cases. The technologies, which include such things as repairing foundation cracks, aerating water to pre-remove dissolved radon, and directing air flow away from the house's exterior foundation surface, are greater than 75 percent efficient and apply to a majority of the problem area. The remaining problem that these technologies could effectively reduce is large.

proven (3) + >75% effic./majority (NC) + large (+1) = 4

5. *Indoor Air Pollutants Other than Radon: ranking = 4*

Technologies available include product substitution or restricted usage (i.e., formaldehyde and solvents), increased building ventilation (which takes time to design), public education to change behavior patterns (i.e., smoking), and mechanical air cleaners. House plants may also help somewhat, but they are not a major control method. The most effective method is increasing ventilation, since it is a proven technology with greater than

75 percent efficiency and applies to the majority of this problem area. The large existing problem could be reduced by ventilation measures.

proven (3) + >75% effic./majority (NC) + large (+1) = 4

6. Radiation from Sources Other than Radon: ranking = 4

The primary source of this problem is FM radio transmitters, which can be controlled by off-the-shelf means such as creating or extending a fenced-off area around the base of the transmitting tower. Customized technological solutions have also been proven; most involve installation of new antennas (versus new towers). The erection of cyclone-type fences and warning signs is greater than 75 percent efficient in controlling the problem and applies to the majority of the problem area. At present, the problem size is estimated as moderate. However, if a connection is found between 60-cycle magnetic fields and childhood leukemia, the potential problem could be massive. It might require rewiring of numerous homes and schools. Questions about effective technology in such a situation are unanswerable at this time.

off-the-shelf (4) + >75% effic./majority (NC) + moderate (NC) = 4

7. Industrial Point Source Discharges to Surface Waters: ranking = 5

Industrial dischargers usually have treatment procedures for the pollutant stream. However, many discharges will require additional treatment for toxic pollutants and effluent toxicity before water quality standards are met. The technologies to achieve this, while sometimes expensive, are generally well-developed. Those technologies include in-plant process modifications, biological treatment improvements and chemical addition, filtration, air stripping, nitrification/denitrification, and sulfide precipitation. The technologies also can be very efficient, greater than 90 percent. The large problem in this area could be effectively reduced by available technologies.

off-the-shelf (4) + >75% effic./majority (NC) + large (+1) = 5

8. POTW Discharges to Surface Waters: ranking = 5

Many municipal dischargers now have secondary treatment as required by the Clean Water Act, but in many critical water quality areas additional controls are needed to abate combined sewer overflows (CSOs), improve industrial pretreatment, eliminate chlorine toxicity, and reduce excessive nutrients. The technology to achieve this, while often quite expensive (particularly for CSO and nutrient control), is well known. Those technologies include biological treatment improvements, chemical addition, dechlorination, filtration, nitrification/denitrification, pretreatment program implementation, and for CSOs separation, storage (in-line, off-line, deep tunnel), relocation to less sensitive areas, and treatment. These technologies can be very effective, 75 percent to over 90 percent. These technologies could effectively reduce a large existing problem.

off-the-shelf (4) + >75% effic./majority (NC) + large (+1) = 5

9. Nonpoint Source Discharges to Surface Waters: ranking = 4

Use of technological controls or best management practices (BMPs) to abate pollution from nonpoint sources is the primary cause of nonattainment of water quality goals in many areas. Many critical-use areas such as shellfish beds, beaches, small streams, impoundments, and lakes require protection from coliform bacteria, metals, polynuclear aromatic hydrocarbons (PAHs), pesticides, nutrients, and other pollutants from nonpoint sources. The available technologies include agricultural and construction BMPs; stormwater detention of infiltration basins; local bylaws/regulations on subsurface wastewater disposal, land use, and drainage system design; and diversion from critical use areas. These potentially available technologies are only estimated at 50 percent to 75 percent efficiency because of the variability associated with implementation and enforcement. A large problem exists and these technologies could effectively reduce the problem.

off-the-shelf (4) + 50-75% effic./majority (-1) + large (+1) = 4

10. Discharges to Estuaries, Coastal Waters, and Oceans from All Sources: ranking = 5

Discharges to estuaries include those point and nonpoint sources discussed in problem areas #7, #8, and #9, as well as wetlands impacts (problem area #11), ocean dumping, dredging, offshore oil drilling, etc. The major technologies are municipal and industrial treatment facility improvements, pretreatment, CSO abatement, nutrient control where necessary, nonpoint source controls, and wetland protection as discussed in the other problem areas. These technologies are available (although often expensive) and efficient. There is a large existing problem that these technologies could effectively reduce.

off-the-shelf (4) + >75% effic./majority (NC) + large (+1) = 5

11. Wetlands/Habitat Loss: ranking = 3

The primary technologies or practices available in this area include enforcement, education, local regulations, and advanced identification of sensitive areas. These technologies, while not very sophisticated but potentially available, are only estimated at 50 percent efficiency because of the variability associated with implementation and enforcement. The technologies could effectively reduce a large existing problem.

off-the-shelf (4) + <50% effic./majority (-2) + large (+1) = 3

12. Drinking Water: ranking = 4

The technologies available include filtration, activated carbon, aeration, corrosion reduction, improved monitoring, and source protection. These technologies are currently available, and efficiency is estimated at greater than 75 percent. The size of the existing problem is estimated as moderate.

off-the-shelf (4) + >75 % effic./majority (NC) + moderate (NC) = 4

13. RCRA Waste Sites: ranking = 4

Available technologies cover a wide range, depending upon the wastes in question. Off-the-shelf technologies include incineration, physical/chemical treatment, biological treatment, air/steam stripping, injection, carbon adsorption, and encapsulation. Proven technologies include in-situ biological treatment, flushing, freezing, precipitation, ion exchange, photochemical treatments, thermal fusion, and electrokinetics. For this problem area, the person questioned judged the most effective technologies to be incineration, physical/chemical treatment, and biological treatment, which he termed off-the-shelf. However, the work group deemed most technologies for this problem area to be "proven." They apply to a majority of the problem's sources, with greater than 75 percent efficiency. A large problem exists in this area, despite currently applied technology.

proven (3) + >75% effic./majority (NC) + large (+1) = 4

14. Superfund Waste Sites: ranking = 3

The technologies available for Superfund waste sites include impermeable caps, simple permeable caps, RCRA-type landfills, incineration, conventional biological treatment, in-situ biological treatment, in-situ chemical treatment, solvent extraction, dechlorination, and oxidation/reduction. These technologies are waste-dependent and can generally be grouped into four categories: incineration, containment, chemical treatment, and biological treatment. All of them have efficiencies of at least 75 percent, if not 99 percent; however, the portion of the problem to which they apply varies greatly, resulting in different rankings for the groups.

Averaging the rankings resulted in the overall ranking.

Specifically:

Category	Incineration	Containment	Chemical Treatment	Biological Treatment	Description
Technology	3	4	2	3	Off Shelf Proven New Technology Experimental None
Efficiency	X	X	X	X	>99% >75% 50%-75% <50%
Applicability	NC	NC	NC	-1	Nearly all Majority Small
Existing Problem	+1	+1	NC	NC	Large Moderate Small
Ranking	4	5	2	2	XXXXXXXXX

Average ranking = 3.

$$\frac{4+5+2+2}{4} = 3$$

Overall:

mostly proven technology (3) + >75% efficient/small applic. (-1) + large (+1) = 3

15. Municipal Waste Sites: ranking = 4

Available technologies range from off-the-shelf to experimental and include sewage sludge incinerators, municipal waste incinerators, liners, leachate collection systems, monitoring wells, slurry walls, capping with runoff collection, pump-and-treat systems, gas collection systems, fixation/stabilization, and biodegradation. Either incineration or a combination of liners, leachate collection systems with treatment, capping, and slurry walls is the most effective technology. All are proven technologies, are generally greater than 99 percent efficient, and apply to nearly all sources of the problem. Nevertheless, the existing problem is large enough to allow application of further technology to have a great impact.

proven (3) + >99% effic./nearly all (NC) + large (+1) = 4

16. Industrial Waste Sites: ranking = 4

The available technologies for this problem area are generally the same as those for Municipal Waste Sites (problem area #15); therefore, the ranking is the same.

17. Accidental Releases: ranking = 3

The technologies or practices available for accidental releases include spill prevention control plans, inspection programs, dikes, emergency response plans/training, and employee training/safety programs. These technologies, while fairly simple and potentially available, are only estimated at 50 percent to 75 percent efficiency because of the variability associated with implementation and enforcement and the accidental situations. The size of the existing problem is estimated as moderate.

off-the-shelf (4) + 50-75% effic./majority (-1) + moderate (NC) = 3

18. Releases from Storage Tanks: ranking = 4

The primary technologies or practices available in this area include tank testing requirements, site evaluations, and tank upgrading (protective coating, fiberglass). The technologies are currently available, and efficiency is estimated at greater than 75 percent (the major variable being proper installation). The existing problem is large, and these technologies could effectively reduce the problem.

off-the-shelf (4) + 50-75% effic./majority (-1) + large (+1) = 4

19. Other Ground-Water Contamination: ranking = 3

The technology or practices available include wellhead protection programs (under the Safe Drinking Water Act). States are given some flexibility in designing these programs. Many are still developing work plans, which are reviewed by EPA. Other practices include Sole Source Aquifer Designation, nonpoint source assessment and management programs, the

Underground Injection Control program and proposed pesticide strategy. The practices, while potentially available, are only estimated at 50 percent to 75 percent efficiency because of the variability associated with implementation and enforcement. The work group judged these practices to be "proven." The size of the existing problem that these technologies could address is estimated as large.

proven (3) + 50-75% effic./majority (-1) + large (+1) = 3

20. Pesticide Residues on Foods: ranking = 4

Under FIFRA, EPA establishes pesticide tolerance levels for raw agricultural commodities and, under FDCA, FDA enforces the residue tolerances on food and feed in interstate commerce. Residue tolerance levels must be established before the pesticide's use on the food/feed crop is allowed. Most of these levels are set at one-hundredth of the pesticide's "no observed effect level" (NOEL), as determined for each chemical by animal exposure studies. Where more uncertainty exists about the studies, the tolerances may be set as low as one-thousandth of the NOEL. This method of controlling the problem area applies to nearly all sources, and is greater than 75 percent efficient. The work group judged that it qualified as an "off-the-shelf technology," as we defined that category. The size of the existing problem is estimated as small.

off-the-shelf (4) + >75% effic./nearly all (NC) + small (NC) = 4

21. Pesticide Application: ranking = 4

Many methods are available for controlling this problem area. The most readily applied include use of protective clothing, use of appropriate application equipment for a given scenario (i.e., ultra-low volume techniques for aerial agricultural spraying or injectors for termiticide application), and observation and compliance with directions and precautionary statements. A newer technology that shows great promise is integrated pest management (IPM). IPM relies on biological, chemical, and physical control measures, along with proper timing of application and certain cultural practices. Although it requires much more research, and each pest problem will need separate control methods or "programs," IPM is potentially the most effective technology because it can be adapted to all areas of pesticide use, including agriculture, household pest control, termite control, and lawn care. Like the other methods currently in use, IPM has an efficiency greater than 75 percent. The large existing problem in this area could be effectively reduced by the technologies.

proven (3) + >75% effic./nearly all (NC) + large (+1) = 4

22. Lead: ranking = 4

Lead is a problem in all three media: air, water, and soil. Since there are no major lead smelters in New England, Region I's lead in air problem can be greatly reduced by minimizing lead in gasoline. Lead in drinking water comes mostly from corrosion of lead piping and can be most effectively controlled by the use of corrosion inhibitors, although pH adjustment and/or $CaCO_3$ saturation will also work. Soil or dust lead problems can be reduced by removing and replacing lead-contaminated topsoil. This method is most effective when the replacement soil is also seeded. Other methods of reducing contact include removal of lead-containing paint and damp-mopping surfaces where leaded dusts may settle. All of the technologies are greater than 75 percent efficient and apply to most or nearly all of the problem's sources. The existing lead problems in air, water, and soil were estimated respectively as moderate, large, and large.

Air:
off-the-shelf (4) + >75% effic./majority (NC) + moderate (NC) = 4

Water:
proven (3) + >75% effic./nearly all (NC) + large (+1) = 4

Soil:
proven (3) + >75% effic./majority (NC) + large (+1) = 4

23. Asbestos: ranking = 5

Asbestos in drinking water can be effectively controlled by coagulation, sedimentation, and filtration if its source is the water itself. Corrosion control with zinc compounds or pipe replacement is effective for piping sources, which account for most of the problem in water. Most of the air-related asbestos in New England comes from building demolitions and renovations. Emissions control is effectively achieved by proper wetting techniques, enclosure of the removal area with plastic sheeting, maintenance of slightly negative pressure within the enclosure, air filtering with HEPA filters, and proper waste disposal. If not removed, asbestos building materials can be encapsulated to minimize airborne emissions. All of the above technologies are simple to apply, greater than 75 percent efficient, and applicable to nearly all sources. The remaining asbestos air problem is large, whereas the water problem is small. In view of this and the fact that the major route of exposure is inhalation, the overall ranking was influenced more towards the air ranking.

Air:
off-the-shelf (4) + >75% effic./nearly all (NC) + large (+1) = 5

Water:
off-the-shelf (4) + >75% effic./nearly all (NC) + small (NC) = 4

24. Lakes, Ponds, and Impoundments: ranking = 5

The technologies described in problem areas #7, #8, and #9 (point and nonpoint sources) are applicable for upstream sources to impoundments. In addition, lake restoration technologies that improve water quality in affected lakes should be added. These include sediment removal, nutrient fixation with alum, weed harvesting, and others. These technologies are currently available, and efficiency is estimated at 75 percent to 90 percent, with the higher efficiencies for point source controls and the lower for nonpoint and lake restoration techniques. These technologies could effectively reduce a large problem.

off-the-shelf (4) + >75% effic./majority (NC) + large (+1) = 5

Effective Technology Questionnaire

Problem Area: ____

1. Considering the size and nature of the pollution problem remaining (after existing controls) in the area cited above, list what pollution control technologies or management practices you consider capable of further problem or risk reduction. Please list below by category of technological sophistication and uncertainty:

   - Off-the-Shelf, little implementation delay for testing or modification

     ____
     ____
     ____

   - Proven Technology, more time and experimentation to fit technology/practices to individual case than above

     ____
     ____
     ____

   - New Technology, coming out of pilot phase but not yet in widespread full scale use

     ____
     ____
     ____

   - Experimental Technology, pilot stage unproven for widespread use

     ____
     ____
     ____

2. Of the above technologies please list those which you think would be most effective.

   ____
   ____
   ____

Note: The remaining questions refer to the Technology in Item 2 Above.

3. Please characterize the technology listed in Item 2 above by checking the most appropriate description of this technology (check only one).

    ____ Off-the-shelf
    ____ Proven technology
    ____ New technology
    ____ Experimental technology
    ____ No apparent technology

4. What is your estimate of the efficiency of this technology? (Note: an efficiency estimate of the technology itself is requested, not the amount of the total problem it addresses.)

    ____ >99%
    ____ >75%
    ____ 50-75%
    ____ 50%

5. How large a portion of the problem does this technology address?

    ____ Nearly all sources
    ____ Majority of problem area
    ____ Small portion of problem

6. Absolute size of the problem currently remaining (after existing controls).

    ____ Large enough to allow technology to have a great impact
    ____ Moderate
    ____ Small

Name ____

Phone Number ______________________ Mail Code ____________

Thanks for your assistance.